KNAUER

AZURA

Assistant ASM 2.1L
User Manual

V6815A

HPLC

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Intended Use

Note Only use the device for applications that fall within the range of the intended use. Otherwise, the protective and safety equipment of the device could fail.

ASM 2.1L ASM 2.1L is suitable for the liquid chromatography. The ASM 2.1L is a multifunctional device which can be configured with up to three micro devices by the user. Up to three micro devices of a total of five different micro devices for the HPLC (High performance liquid chromatography) can be assembled into an ASM 2.1L. The micro devices in the ASM 2.1L are controlled with chromatography software or optional Control Unit.

ASM 2.1L as compact HPLC With a suitable selection of micro devices the ASM 2.1L can be used as a supplementary module for the HPLC or it can be combined to a compact HPLC system for chromatographic analyses in the high pressure range.

Operating range The device can be used in the following areas:

- Biochemistry analyses
- Chemical analyses
- Food analyses
- Pharmaceutical analyses
- Environmental analyses

Features of the Individual Micro Devices

Following devices can be integrated:

Detector UVD 2.1S A test cell is preassembled to the detector. Before the detector can be used, the test cell has to be replaced by a flow cell.

- Single-channel detector with variable wavelength
- With the deuterium lamp spectra from 190 nm to 500 nm can be measured.
- Flexible use in the entire range of HPLC: Analytical flow cells and preparative flow cells
- Automatic recognition and storing of device-specific information, which are important for Good Laboratory Practice, operation qualifications, or repairing the device

Pump P 2.1S/P 4.1S

- Dual-piston technology
- Liquid transport with stable flow rate and high flow accuracy
- Long service life
- 10 ml and 50 ml pump head selectable
- With or without pressure transducer
- Optional pump heads made of titan for bio-compatibility

Valve Drive V 2.1S There is the valve drive V 2.1S 6V/12V/16V, whereby the additional details refer to the ports of the valves. The valves fall into two categories:

- 2-position valves
  2-postion valves are used to inject the sample from the sample loop in the pumps high pressure flow, so that the sample is transported to the column. In case of 2-position valves at the valve drive the rotary motions are limited to positions with a rotation angle of 60°.
- Multiposition valves
  Multiposition valves are used to switch fluid streams, e.g. the selection of eluents, columns or for fractionating of eluate.
- Valve heads available in stainless steel and PEEK
- Valves of the company VICI Valco Instruments Co.Inc. can be installed.

Degasser

- The usage of a degasser in front of the pump leads to a stable base line of the chromatogram.
- Eluents must not be degassed before they be used in the HPLC.
- Analytical flow rate up to 10 ml/min

Eluents

Even small quantities of other substances, such as additives, modifiers, or salts can influence the durability of the materials.

Note The list of selected solvents was compiled based on research in the pertinent literature and is only a recommendation. If there is any doubt, contact the Technical Support of the manufacturer.

Suitable eluents	Less suitable eluents	Not suitable eluents
▪ Acetone at 4°-25° C (39.2°-77.0° F)[1] ▪ Acetonitrile ▪ Benzene ▪ Chloroform ▪ Ethyl acetate ▪ Ethanol ▪ Hexane/heptane at 4°-25° C (39.2°-77.0° F)[1] ▪ Isopropanol ▪ Carbon dioxide (liquid 99.999% CO_2) ▪ Methanol ▪ Phosphate buffer solutions (0.5 M) ▪ Toluol ▪ Dilute ammonia solution ▪ Dilute acetic acid (10-50%), at 25° C/77.0° F ▪ Dilute sodium hydroxide (1M) ▪ Water	▪ Dimethyl sulfoxide (DMSO) ▪ Slightly volatile eluents ▪ Methylene chloride ▪ Tetrahydrofuran (THF) ▪ Dilute phosphoric acid	▪ Halogenated hydrocarbons, e.g. Freon® ▪ Concentrated mineral and organic acids ▪ Concentrated bases ▪ Eluents containing particles ▪ Perfluorinated eluents, e. g. Fluorinert® FC-75, FC-40 ▪ Perfluorinated polyether, e.g. Fomblin®

1. valid for the specified temperature range

Device Overview

Compact HPLC Isocratic

By combination of the following devices a complete isocratic HPLC system is created:

- Pump 4.1S with 10 ml pump head
- Detector UVD 2.1S
- Degasser DG 2.1S, analytical, 2-channel

During the configuration as a compact HPLC a valve is mounted laterallly on the ASM 2.1L. An eluent tray will be supplied to the compact HPLC.

Legend

① Solvent tray

② Degasser

③ Pump with pressure transducer

④ Detector

⑤ Valve

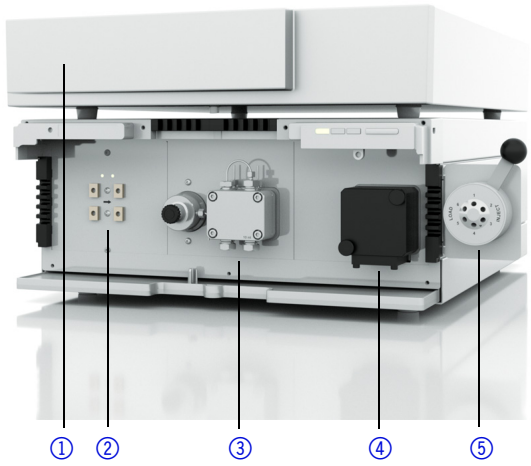


Fig. 1 ASM 2.1L in the version compact HPLC, isocratic

Compact HPLC for High Pressure Gradients

For a high gradient HPLC system the ASM 2.1L needs to be combined with a detector UVD 2.1L. The ASM 2.1L is equipped with following devices:

- Pump 2.1S without pressure transducer, with 10 ml pump head
- Pump 4.1S with pressure transducer, with 10 ml pump head
- Degasser DG 2.1S, analytical, 2-channel
- Smartmix 350

A valve is mounted laterallly on the detector UVD 2.1L. An eluent tray is supplied with the compact HPLC system.

More information about the detector UVD 2.1L can be found in the corresponding user manual.

Legend

① Solvent tray

② Detector

③ Pump with Smart-mix

④ Pump with pressure transducer

⑤ Degasser

⑥ Valve

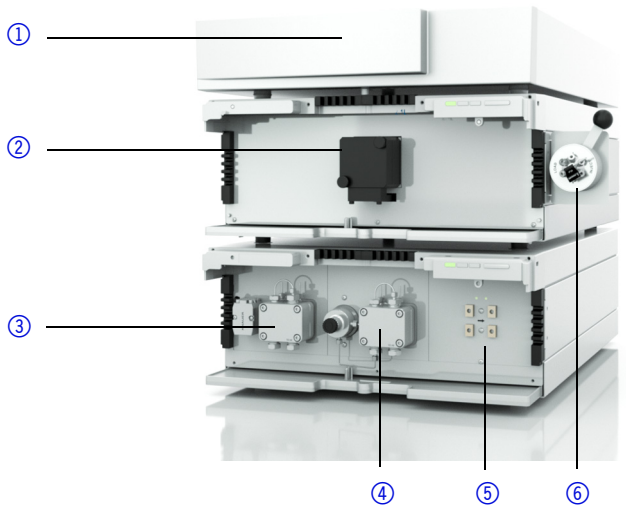


Fig. 2 Compact HPLC HPG with UVD 2.1L

Device Overview in the ASM 2.1L

As an additional module for the HPLC system, the ASM 2.1L can be equipped with different devices on request.

Devices in the ASM 2.1L

Following devices can be mounted in the ASM 2.1L:

Device	Comment
Pump P 2.1S	Pump without pressure transducer with a 10 ml or 50 ml pump head. As a material for the pump head interior titanium or stainless steel can be chosen. For the 10 ml pump head ceramic can be chosen.
Pump P 4.1S	Pump with pressure transducer with a 10 ml or 50 ml pump head. As a material for the pump head interior titanium or stainless steel can be chosen. For the 10 ml pump head ceramic can be chosen.
Detector UVD 2.1S	UV/Vis detector with variable wavelength 190 nm- 500 nm.
Valve drive V 2.1S	Valve drives 6V, 12V, 16V for manual valves
Electrical valves	Valves of the company VICI Valco Instruments Co.Inc.

Device	Comment
Manual valves	▪ KNAUER 2-position valves or multi-position valves ▪ Valves of the company VICI Valco Instruments Co.Inc.
Degasser DG 2.1S	By using a degasser a more stable baseline can be obtained..

Detector in the ASM 2.1L

The ASM 2.1L can be equipped with a detector.

Legend

① Detector

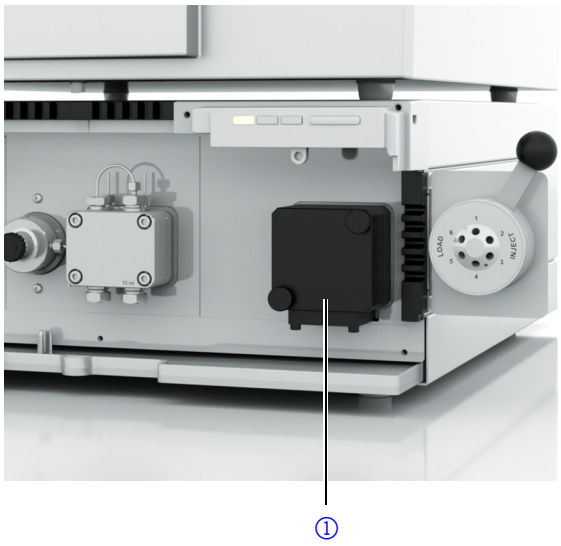


Fig. 3 Detector in the ASM 2.1L

The UVD 2.1S will be delivered with a test cell. For the use of the detector a flow cell has to be installed.

Flow cells

Flow cells are available with different layer thicknesses, connections and also for different maximum flow rates. The flow cells are made of stainless steel or PEEK. U-Z View™ micro flow cells are made of quartz glass.

	Layer thickness	Connectors	Material	Flow rate
Analytical flow cells	3 – 10 mm	1/16“	Stainless steel Layer thickness 3 mm also in PEEK	20 – 50 ml/min
Preparative flow cells	0.5 / 1.25 / 2/ 5 mm	1/4”,1/8”, 1/16“	stainless steel and PEEK	250 – 10000 ml/min

	Layer thickness	Connectors	Material	Flow rate
U-Z View™ Micro	8 mm	1/16“ 280 µm	Quartz glass	0.10 ml/min 0.01 ml/min

Pump in the ASM 2.1L

The ASM 2.1L can be equipped with a pump P 2.1S/P 4.1S.

Legend

① Pressure transducer

② Pump head

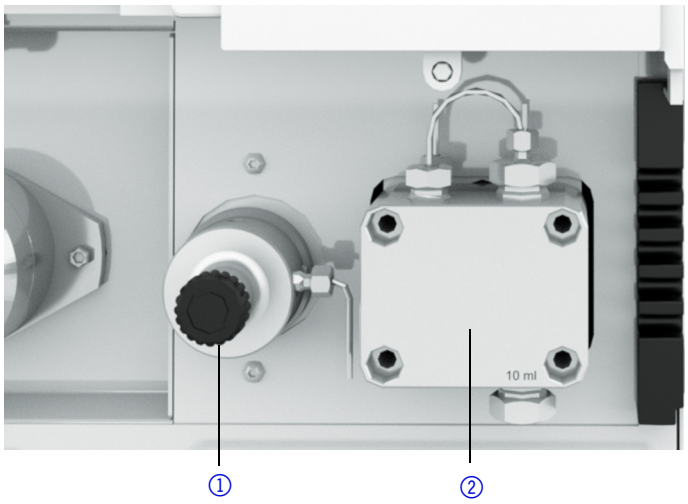


Fig. 4 Pump with pressure transducer in the ASM 2.1L

Additionally the pump P 4.1S is equipped with a pressure transducer.

Pump heads

The pump heads can be easily removed and replaced via four front-accessible screws by the user.

Pump head	Maximum pump capacity
Stainless steel	10 ml
Titanium	10 ml
Stainless steel	50 ml
Titanium	50 ml
Ceramic	10 ml

Valve Drives in the ASM 2.1L

Prior to delivery the valve drive can be equipped with KNAUER multiposition valves and 2-position valves.

Legend

① Valve

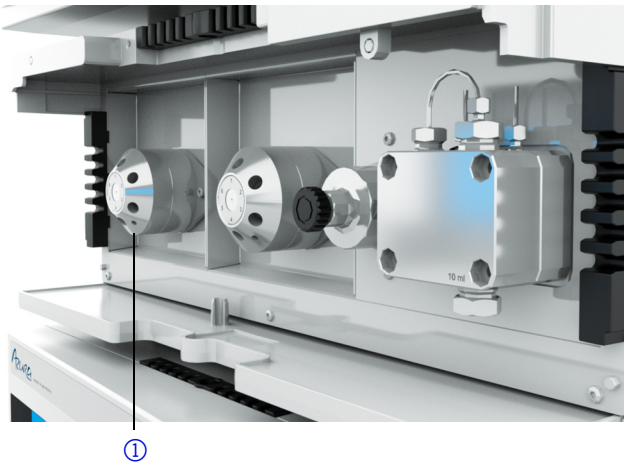


Fig. 5 Valves in the ASM 2.1L

Usage

- 2-positon valves are mainly used for injections.
- Multiposition valves are used to switch fluid streams. For example columns and eluents are selected and eluate are fractionated.

Valves

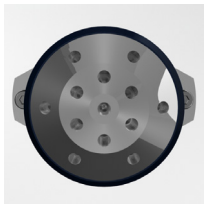
Valve types

There are two different types of KNAUER valves: Multiposition and 2-position valves.

- Connections and channels of 2-position valves are described by abbreviations.
  Example 6P/3C: This is a 2-position valve with 6 ports and 3 channels.
- In case of multiposition valves the central port is not counted.

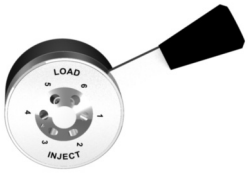
The valve drive depends on the number of the valve ports. The ASM 2.1L can be equipped with following valves:

Valve	Port size	Switch positions	Material	Pressure stability
2-position valve: ▪ 6P/3C ▪ 6P/2C	1/16" 1/8"	2	Stainless steel, PEEK	300 bar



Valve	Port size	Switch positions	Material	Pressure stability
6-port multiposition valve	1/16" 1/8"	6	Stainless steel, PEEK	300 bar
12-port multiposition valve	1/8"	12	Stainless steel	25 bar
16-port multiposition valve	1/16"	16	Stainless steel	50 bar; 100 bar

2-position Valves



In HPLC the 2-position valve is also used for manual injections. In this case it is mounted on the device via a holding bracket and operated with a lever. The reed contact detects this process. The reed contact causes a short-circuit contact. This short-circuit contact is set by the user, e.g. as a starting signal for the entire system or as a starting signal for a measurement with the detector.

Legend

① Position number

② 6 ports with 2 channels

③ Adapter plate for mounting on the valve drive

④ 6 ports with 3 channels

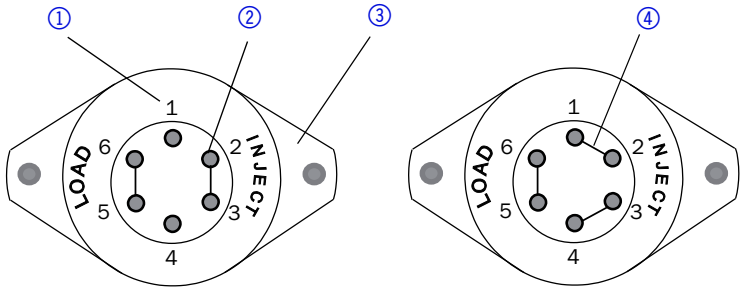


Fig. 6 2-position valves with 6p/2C and 6P/3C

Multiposition Valves

The multiposition valve is used in chromatography, for example in the following cases:

- Selection of up to 16 different solvents
- Fractioning

- Column switching up to 16 columns

Legend

① Position number

② Channel between the central port and the peripheral port

③ Adapter plate for mounting on the valve drive

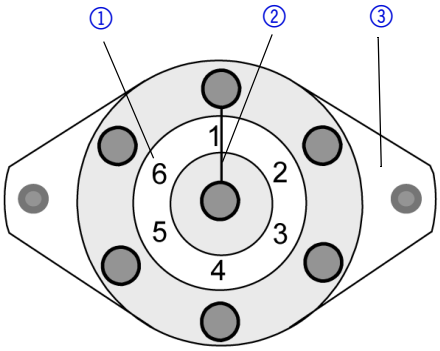


Fig. 7 Scheme of a multiposition valve 6P

Degasser in the ASM 2.1L

The ASM 2.1L can be equipped with a degasser. By using a degasser up to two eluents can be degassed simultaneously in a reliable and comfortable way.

Legend

① Degasser

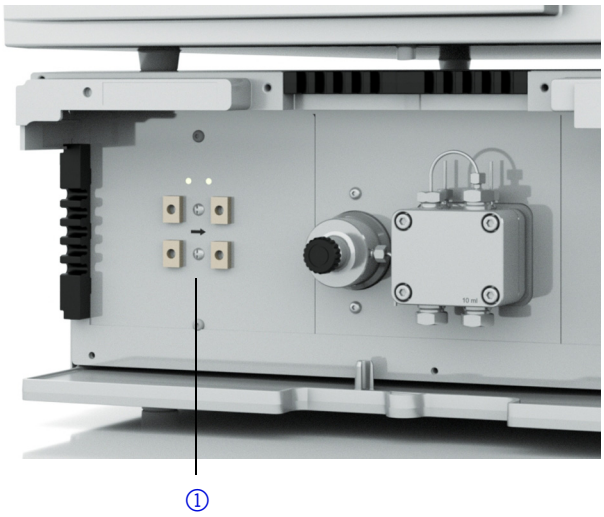


Fig. 8 2-channel degasser in the ASM 2.1L

SmartMix Mixer

The KNAUER SmartMix mixers are solvent mixers that are suitable for high-performance liquid chromatography (HPLC). The liquids are mixed statically in the SmartMix mixer.

Legend

① Blind plug

② Mixer lid

③ Inlet to the pump

④ Mixer housing

⑤ Mounting boreholes

⑥ Micro cartridge in the SmartMix

⑦ Outlet to the column

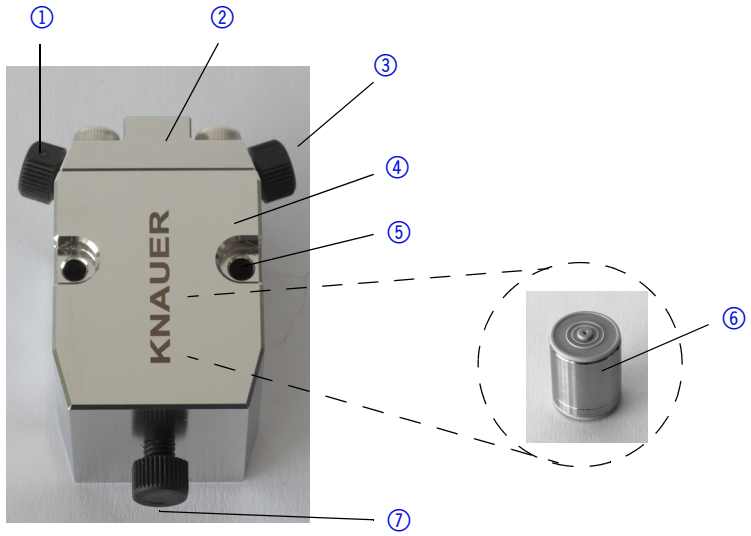


Fig. 9 SmartMix Mixer

To differentiate the installed cartridges, the SmartMix mixer is supplied with different blind plugs:

- The analytical version with the analytical cartridge has a black blind plug.
- The micro version with a micro cartridge has a red blind plug.

Overview Mixer

Flow rate	LPG	HPG
Analytical version	0.5 - 2.0 ml/min	< 5 ml/min
Micro version	0.1 - 0.5 ml/min	< 1.5 ml/min

Cartridge	Mixing volume
Analytical	350 µl
Micro	100 µl

Scope of Delivery

Note Only use original parts and accessories made by KNAUER or a company authorized by KNAUER.

Delivery	ASM 2.1L with devices	☐
	User manual german/english	☐
	Power cable with kettle plug	☐
	Azura Accessories kit	☐
	Installation Qualification Document	☐
Compact HPLC	Capillary kit	☐
	Tool kit	☐
	Solvent tray	☐
Compact HPLC HPG	UVD 2.1L	☐
	Flow cell	☐
	Accessories kit pump	☐
Pump	Exhaust	☐

Safety for Users

Professional group

The user manual is adressed to persons that have qualification as chemical-laboratory technician or comparable vocational training.

The following knowledge is required:

- Fundamental knowledge of liquid chromatography
- Knowledge regarding substances that are suitable only to a limited extent for use in liquid chromatography
- Knowledge regarding the health risks of chemicals

If you do not belong to one of these professional groups, under no circumstances may you perform the work described in this user manual.

What must be taken into account?

- All safety instructions in the user manual
- The environmental, installation and connection specifications in the user manual
- Observe national and international regulations pertaining to laboratory work!
- Original spare parts, tools, and eluents made or recommended by KNAUER

More safety-relevant information is listed in alphabetical order in the following table:

Topic	Explanations
Decontamination	Contamination of devices with toxic, infectious or radioactive substances poses a hazard for all persons during operation, repair, sale, and disposal of a device. All contaminated devices must be properly decontaminated. All materials or fluids used for decontamination must be collected separately and disposed of properly.
Flammability	Organic eluents are highly flammable. Since capillaries can detach from their screw fittings and allow eluent to escape, it is prohibited to have any open flames near the analytical system.
Leak sensor	Observe display on the device, on the control unit, and in the chromatography software.
Eluent tray	Risk of electrical shock or short circuit if liquids get into the device's interior. Place all bottles in an eluent tray.
Eluent lines	Install capillaries and hoses so as to liquids can not get into the interior in case of a leak.
Power strip	If several devices are connected to one power strip, always consider the maximum power consumption of each device.
Power-supply cable	Defective power-supply cables are not to be used to connect the device and the mains power.

Topic	Explanations
Self-ignition point	Only use eluents that have a self-ignition point higher than 150 °C under normal ambient conditions.
Power supply	Only connect devices to voltage sources, whose voltage equals the device's voltage.
Toxicity	Organic solvents are toxic above a certain concentration. Ensure that work areas are always well-ventilated! Wear protective gloves and safety glasses when working on the device!
UV light	Concentrated UV light can disperse from a detector without flow cell or from the optical fiber, which leads to irritation of the retina. When the flow cell or the optical fiber is exchanged, switch the device off and pull the power plug.

Where is use of the device prohibited?

Never use the system in potentially explosive atmospheres without appropriate protective equipment. For further information, contact the technical support of the manufacturer.

Opening the device

The device may only be opened by the technical support of the manufacturer.

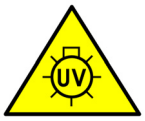
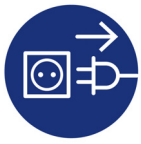
Definition of Personal and Material Damages

Possible dangers related to the device are distinguished in personal and material damages in this user manual.

Category	Explanations
DANGER!	Lethal or very serious injuries can occur.
WARNING!	Serious injuries can occur.
CAUTION!	Moderate injuries or device defects can occur.

Symbols and Signs

The following table explains symbols and labels which are used on the device, on the touchscreen of the Control Unit, in the software or in the manual

	Symbol	Meaning
Marks	CE	Device fulfills the requirements of the *Conformité Européenne*, which is confirmed by the Declaration of Conformity.
		Damage to the leak tray or front cover possible while carrying, setting up and installing a device. Grip the device at its sides near the middle when lifting or moving.
Warning signs		High-voltage hazard
		UV-light hazard
		Electrostatic-discharge hazard
		Leak hazard
Mandatory signs		Pull the power plug.
		Wear protective gloves.
		Observe torques.

Unpacking and Setup

Contacting the Technical Support

You have various options to contact the technical support:

Phone +49 30 809727-111

Fax +49 30 8015010

E-mail support@knauer.net

You can make your requests in English and German.

Location Requirements

CAUTION! Possible damage to the device due to overheating! Set up the device so that it is protected against exposure to direct sunlight.
Make sure the room is well ventilated.
Allow 30 cm space at the rear of the device for air circulation.

Power supply The device is only suitable for alternating current. The supplied power cable is to be used to connect the device to the mains supply.

Requirements The location for the device must meet the following requirements:

▪ Maximum weight	about 14 kg[1]
▪ Dimensions	361 mm x 158.2 mm x 523 mm (Width × Height × Depth)
▪ Power supply	100 – 240V; 50 – 60 Hz; maximum 100 W
▪ Air humidity	10 – 90 %, non-condensing
▪ Temperature	10 – 40 °C 39.2 – 104 °F
▪ Space requirements	▪ Laboratory table for safe and comfortable working ▪ Ventilation and cabling: At least 30 cm clearance around the system

1.Depending on the configuration of the device.

Unpacking

CAUTION! Damage to the flow cell caused by carrying the detector incorrectly!
Lift the detector up with your hands grasping the side panels.

CAUTION! Damage to the leak tray or front cover possible while carrying, setting up and installing a device. Grip the device around the middle of its side panels. In case of the preparative pump, ask a second person for help.

Store all packing materials. Included packing list should be kept for repeat orders.

Tools Utility knife

Procedure

1. Check for damages caused during transportation. In case you notice any damage, contact the technical support and the forwarder company.
2. Setup the delivery so the label is in the correct position. Using the utility knife, cut the adhesive tape. Open the delivery.
3. Remove the foam insert. Take out the accessories kit and the manual.
4. Open the accessories kit and take out all accessories. Check the scope of delivery In case any parts are missing, contact the technical support.
5. Grip the device at its side panels and lift it out of the packaging.
6. Remove the foam inserts from the device.
7. Check for damages caused during transportation. In case you notice any damage, contact the technical support.
8. Set-up the device in its location.
9. Remove the protective foil.

Note The leak sensor may malfunction if the device stands on a tilted surface. Use a level to check that the device stands horizontally.

Connectors on the Rear Side

CAUTION! Possible damage to the device caused by condensed water!
Allow device to acclimate for 3 h, before it is taken into operation.

The USB port is located on the right side. All other ports are located on the rear side of the ASM 2.1L.

Legend

① Label with serial number

② LAN port

③ Interface for the Technical Support

④ Pin header

⑤ Fan

⑥ Integrator output

⑦ Connection and power switch

⑧ USB port for the Control Unit

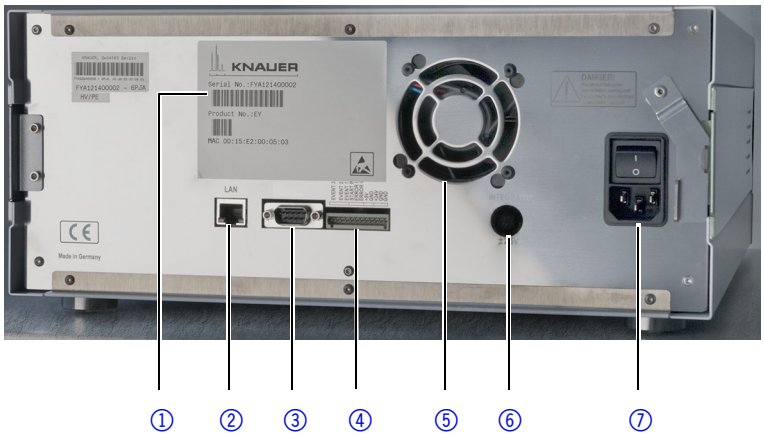


Fig. 10 ASM 2.1L rear view

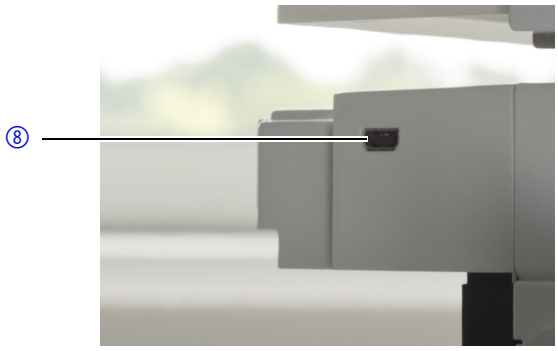


Fig. 11 ASM 2.1L USB port for the Control unit

External devices like computers, fraction collectors, etc. can be connected in 2 different ways to the detector:

- Control with pin header
- Connected to LAN within a network

Controlling with the Pin Header

CAUTION! Short-circuit hazard.
Turn off the device before connecting it to the pin header.
Pull the power plug.

Plug Connector Assignments

The single ports exchange start, control and error signals with other devices.

Connection	Function
EV 3 (Event 3)	**TTL output** Levels: ▪ passive 5 V ▪ active 0 V Pulse: ▪ 0 V for at least 1000 ms
EV 2 (Event 2)	**TTL output** Levels: ▪ passive 5 V ▪ active 0 V Pulse: ▪ 0 V for at least 1000 ms
EV 1 (Event 1)	**Relay contact** The contact is on a floating basis. Its setting depends on the settings in the Control Unit or software. Steady-rate signal: ▪ passive = open relay contact ▪ active = closed relay contact Pulse: ▪ Closed relay contact for at least 1000 ms Permissible load of the relay contact: 1 A/ 24 V DC
START IN	**TTL input** ▪ Low active Secure switching threshold at least 10 mA After receiving a signal (short-circuit to ground) from an external device, the device starts. If controlled with software, an electronic trigger is send through the LAN.
ERROR IN	**TTL input** ▪ Low active Secure switching threshold at least 10 mA After receiving a signal (short-circuit to ground) from an external device, an error message appears and the device stops.

Connection	Function
ERROR OUT	
+5 V	Provides a voltage of 5 V with respect to GND. This makes it possible to supply a consumer that is switched by an EVENT. Max. current: 50 mA
GND	Reference point of the voltage at the signal inputs
+24 V	Event-controlled switching of 24 V against GND Max. current: 200 mA
GND	Reference point of the voltage at the signal inputs

Integrator Output

The integrator output sends measuring signals from the detector.

- non-bipolar
- 1 channel
- 0 – 5 V
- DAC 16 bit
- Scalable
- Adjustable to offset

Initial Startup

Holding Bracket

A holding bracket can be mounted laterally to which valves, columns or flow cells are attached.

Legend

① Holding bracket with valve

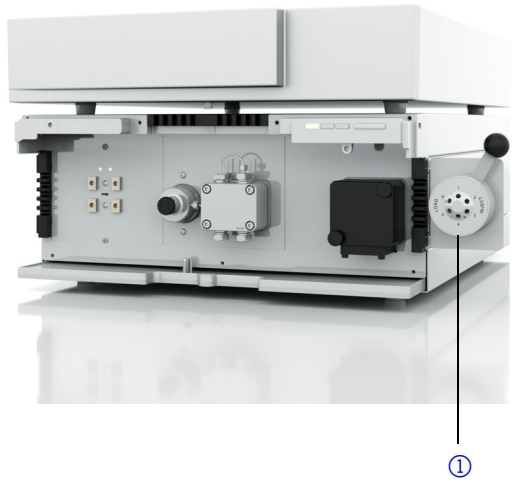


Fig. 12 Valve installed laterally on the device

Following accessories can be mounted onto the side panel:

	Accessories	Comment
Valves	KNAUER valve	Mounting directly at the holding bracket
	VICI Valco valve	Mounting directly at the holding bracket
	VICI Valco valve drive	Mounting by using the adapter plate at the holding bracket
Flow cells	KNAUER flow cells	Mounting by using the adapter plate at the holding bracket
Columns	Axial compressible columns Vertex Plus AX 20 mm and 30 mm	Mounting by using the adapter plate at the holding bracket
Sample loop	Preparative sample loops 11 ml and 40 ml	Mounting by using the adapter plate at the holding bracket

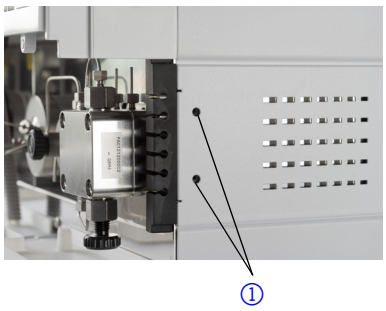
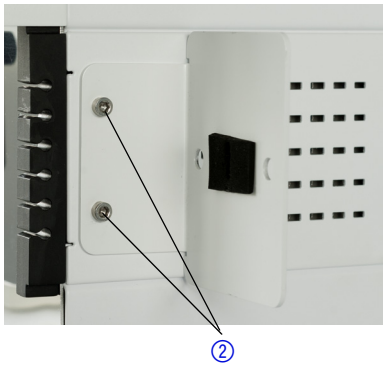
Attaching the Holding Bracket to the Side Panel

Before accessories can be mounted, the holding bracket has to be attached to the side panel.

Procedure Attach the holding bracket with two Allen screws by using a M3 x 6 wrench.

Tools Allen wrench, size 2.5

Procedure

Process	Figure
1. Position the holding bracket onto the bore holes ① at the side panel. 2. Using the wrench, fasten the screws ② .	 **Fig. 13 Bore holes to attach holding bracket on the side panel**  **Fig. 14 Holding bracket is attached**

Result Holding bracket is attached

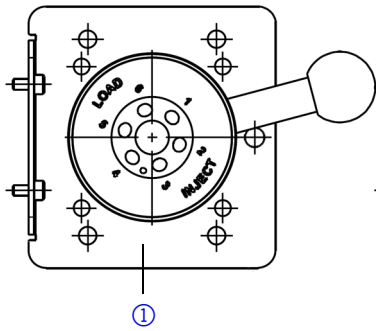
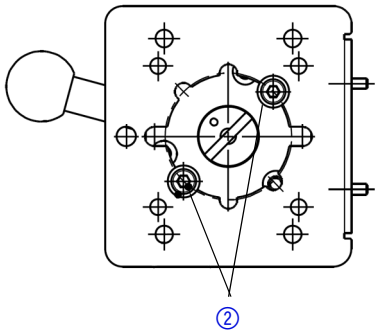
Next steps Mount accessories like valves, flow cells or columns to the holding bracket.

Mounting a KNAUER Valve

Prerequisite Holding bracket is attached to the side panel.

Tools Allen wrench, size 3

Procedure

Process	Figure
1. Position the valve to the front side of the holding bracket ① . 2. Fasten the valve with two screws and two washers ② from the back side.	 **Fig. 15 Front side of KNAUER valve at the holding bracket**  **Fig. 16 Back side of KNAUER valve at the holding bracket**

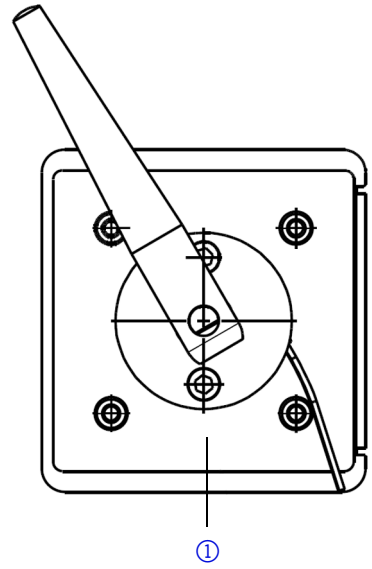
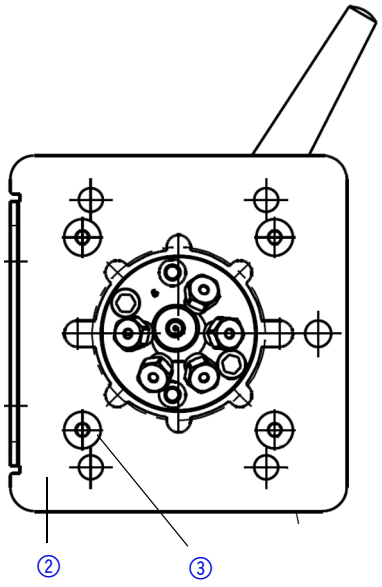
Result The KNAUER valve is mounted.

Mounting a VICI Valco Valve

Prerequisite Holding bracket is attached to the side panel.

Tools Allen wrench, size 2.5

Procedure

Process	Figure
1. Position the adapter plate ① to the back side of the holding bracket. 2. Slide the valve through the hole of the holding bracket ② and the adapter plate forwards as far as possible. 3. Fasten the valve with four screws ③ to the front side.	 **Fig. 17 Back side of VICI Valco valve at the holding bracket**  **Fig. 18 Back side of VICI Valco valve at the holding bracket**

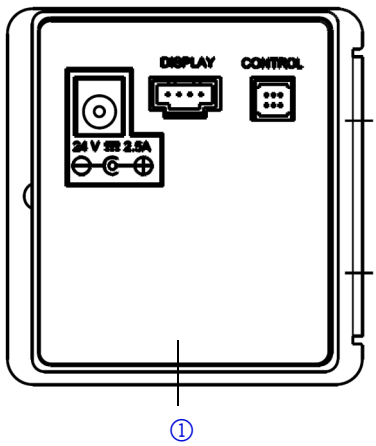
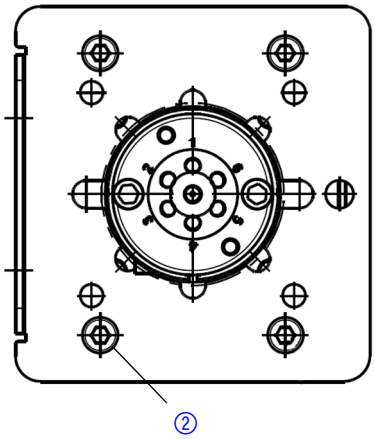
Result The VICI Valco valve is mounted.

Mounting a VICI Valco valve drive

Prerequisite Holding bracket is attached to the side panel.

Tools 9/64" Allen wrench

Procedure

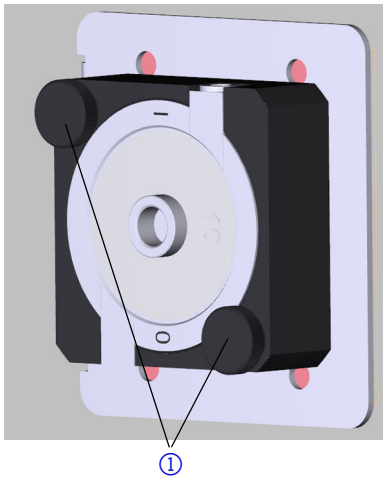
Process	Figure
1. Screw the adapter plate to the back side of the holding bracket. 2. Slide valve drive ① from the rear through the hole of the holding bracket and the adapter plate forwards as far as possible. 3. Fasten valve with four screws ② to the front side.	 **Fig. 19 Back side of VICI Valco valve drive at the holding bracket**  **Fig. 20 Back side of VICI Valco valve drive at the holding bracket**

Result The VICI Valco valve drive is mounted.

Mounting a Flow Cell

Prerequisite Holding bracket is attached to the side panel.

Procedure

Process	Figure
1. Position the adapter plate to the back side of the holding bracket. 2. Position the flow cell to the front of the holding bracket. 3. Fasten the flow cell with both knurled-head screws in position.	 **Fig. 21 Flow cell with adapter plate at the holding bracket**

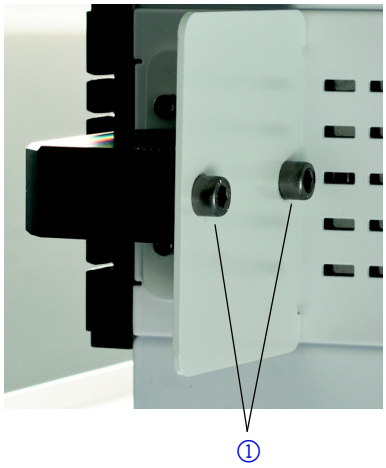
Result Flow cell is mounted.

Mounting Axial Compressible Columns Vertex Plus AX (20 m/30 mm)

Prerequisite Holding bracket is attached to the side panel.

Tools Allen wrench 4

Procedure

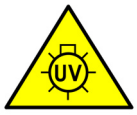
Process	Figure
1. Place the column inside the holder. 2. Position the holder onto the bore holes of the holding bracket. 3. Tighten the screws ① and washers.	 **Fig. 22 Column holder with holding bracket**

Result Axially compressible column is mounted.

Detector

Note Before the detector is ready to use, a flow cell must be installed. Before installing the flow cell, the optical path length can be changed. The optimal path length depends on type and quantity of the sample.

Setting the Optical Path Length



WARNING! Irritation of retina through UV light!
Concentrated UV light can leak out from the flow cell or the fiber optic connectors.
Switch off the device and pull the power plug.

The optical path length is set to 2 mm at the factory. You can remove the spacers on one or both sides and hence change the path length to 1.25 mm or 0.5 mm.

Prerequisite Flow cell has been disassembled.

Tools 3 mm Allen wrench

Legend

① Threaded ring

② Cover

③ Spacer

④ Compression bushing

⑤ Light guide with PTFE seal

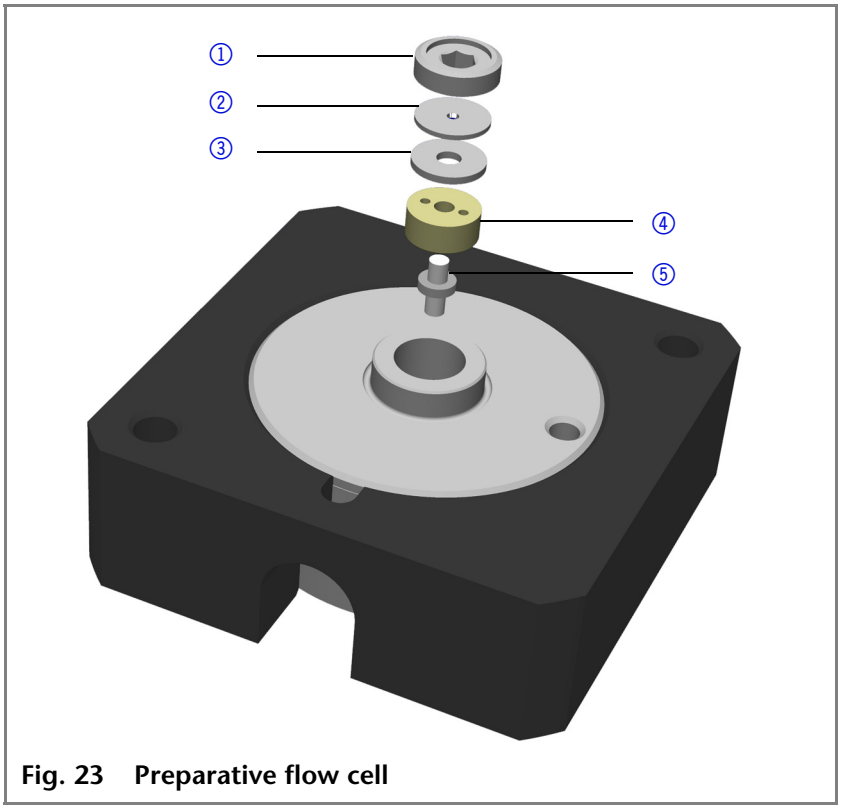


Fig. 23 Preparative flow cell

Procedure

1. Using the wrench, unscrew and remove the threaded ring ① .
2. Remove the cover ② and spacer ③ . Put the spacer aside.
3. Insert the cover.
4. Using the wrench, tighten the threaded ring.

Enlarging the optical path length

To enlarge the optical path length, put in one or both spacers.

Inserting the Flow Cell

The test cell has no connectors for capillaries and must therefore be replaced by a flow cell before first usage.

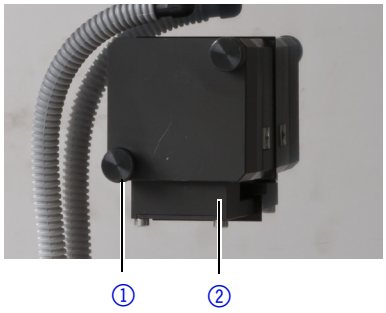
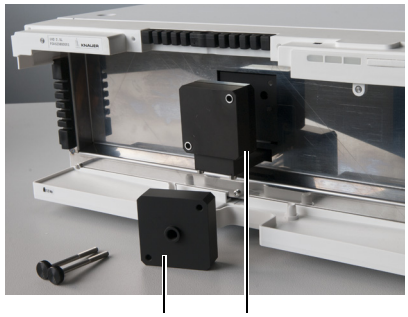
Note

The test cell is used during operation qualifications and must be stored.

Prerequisite

- Detector has been switched off.
- Power plug has been pulled.

Procedure

Process	Figure
1. Unscrew the 2 knurled-head screws ①. 2. Pull out the slide ② as far as it takes to take out the test cell.	 ① ② **Fig. 24 Removing the slide**
3. Remove the test cell ③. 4. Insert the flow cell into the slide. 5. Push the slide into the detector ④. 6. Tighten the knurled-head screws.	 ③ ④ **Fig. 25 Assembling the flow cell**

Result

Flow cell is assembled.

Next steps

Connecting the capillaries

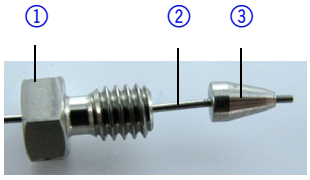
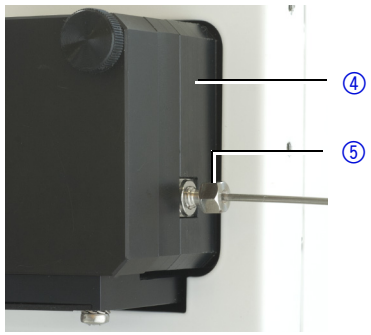
Connecting the Capillaries

CAUTION! Damage to the flow cell caused by strongly tightened fittings!
Check the torque of screw fittings:
- 5 Nm for stainless steel fittings
- 0.5 Nm for PEEK fittings

Prerequisite Flow cell has been assembled.

Tools Open-end wrench

Procedure

Steps	Figure
1. Push the capillary ② through the fitting ①. 2. Push the clamping ring ③ onto capillary.	 **Fig. 26 Capillary fitting**
3. Manually, screw together the capillary and the flow cell ④. To avoid leaks, tighten the fitting ⑤ with a maximum torque of 5 Nm by using the open-end wrench.	 **Fig. 27 Capillary and flow cell**

Result Capillaries have been connected and the detector is ready for operation.

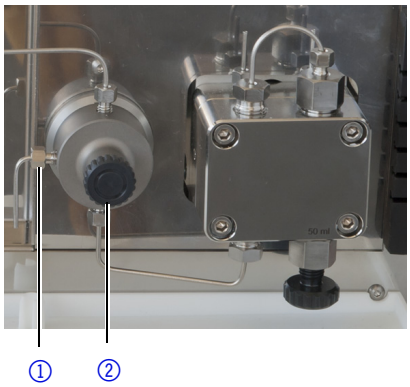
Bleeding the Pump

Before the pump can be used for analyses it has to be bleeded. That means air will be removed from pump head and capillaries.

Prerequisite Capillary connections are connected.

Tools Syringe

Procedure

Process	Figure
1. Start the pump at a low flow rate. 2. Open the bleed screw ② of the pressure sensor. 3. Connect the syringe with the bleed tube ① by using a piece of hose. 4. Suck in fluid at the bleed tube by using a syringe. 5. If the sucked fluid flows continuously, stop suction and close the bleed screw.	

Result No air bubbles in the pump head and in the capillaries.

Connecting a 2-position Valve

Procedure

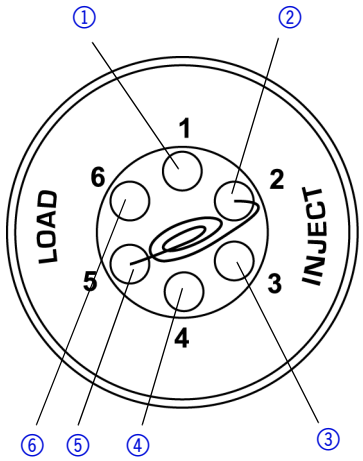
Process	Figure
1. Connect the capillary for sample injection to port ① 2. Connect the sample loop to the ports ②, ⑤ 3. Connect the capillary from column to port ③. 4. Connect the capillary ④ from the pump. 5. Connect tje capillary from the waste container to port ⑥.	

Fig. 28 Connections for 2-position valve

Application Examples for Valves

2-position valve 6P/3C

- Injection
- Selection of a column
- Backflushing of a column
- Backflushing of a precolumn

- Sample accumulation on a precolumn
- Alternating accumulation of a sample

2-position valve 6P/2C

- Preseparation and analyses on several columns after each other
- Sample precleaning by a precolumn
- Alternating precleaning of a sample

Multiposition valve

- Alternating switching of up to 16 columns
- Selection of an eluent
- Sample fractioning

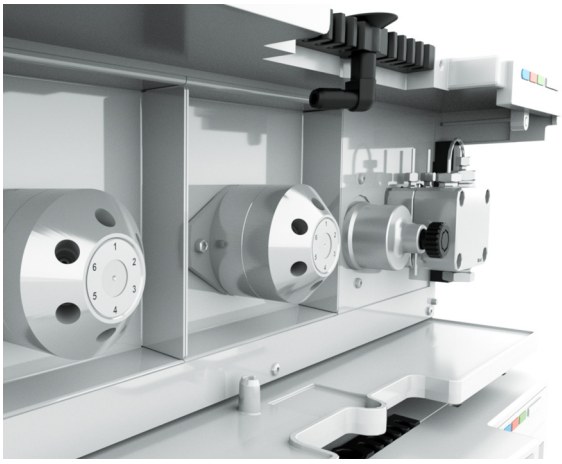


Fig. 29 Valves in the ASM 2.1L

2-position valve 6P/3C

Valve position *Load(L)*

In the valve position *Load*, the sample is filled into the sample loop.

Valve position *Injecting (I)*

In the valve position *Inject* the sample is transported to the column for separation.

Port 1: Sample injection
Port 2: Sample loop
Port 3: Column
Port 4: Pump
Port 5: Sample loop
Port 6: Abfall

Load	Inject

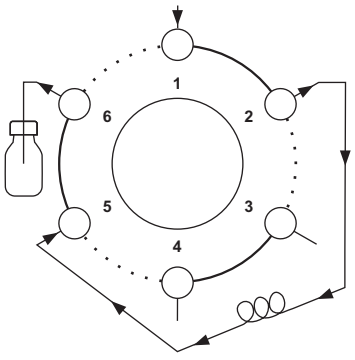
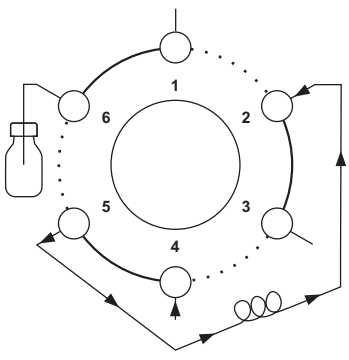

	

Fig. 30 Valve position Load	**Fig. 31 Valve position Inject**

- The sample loop is filled by injecting the sample at port 1. The sample runs into the sample loop (port 2 and 5) and excessive sample is transported into the waste container through port 6.
- The valve will be switched from Load to Inject.
- The pump (port 4) transports the sample to the column (port 3).
- The eluent flows through the sample loop in opposite direction during the injecting, see arrows in the figures.

Reed contact The reed contact informs the analytical system whether the valve is positioned to '*LOAD*' or '*INJECT*'.

Column selection

Basics The column selection is used in chromatography, for example in the following cases:

- Method development
- Usage of different columns in the same HPLC system

From the valve, the sample is transported through the channel 2->1onto the column A. From connection 5, the components of the sample are forwarded separately to the detector.

Legend

① Detector

② Column A

③ Valve

④ Column B

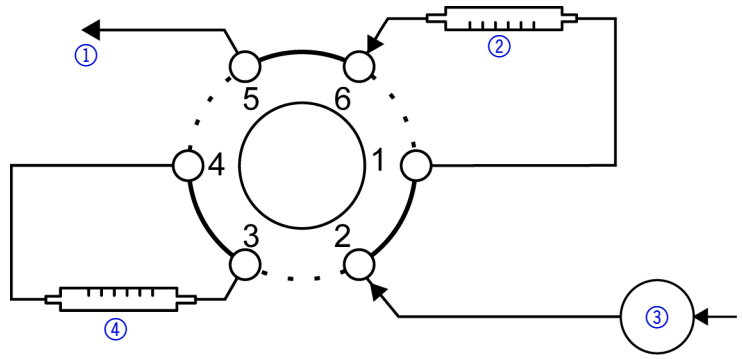


Fig. 32 Column selection-Usage of Column A

Note Make sure there is no pressure when switching so that the columns are not damaged.

After switching the valve, the sample is transported through the channel 2->3 to the column B. From connection 5, the components of the sample are forwarded separately to the detector.

Legend

① Detector

② Column A

③ Injection

④ Column B

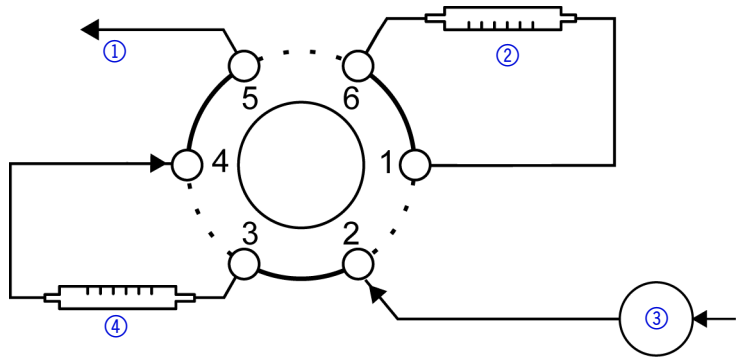


Fig. 33 Column selection-Usage of Column B

Backflushing of a Column

Basics The backflushing of a column is used in chromatography, for example in the following cases:

- Analysis of heavily retarding substances
- Optimization of analysis times
- Flushing of a column

Note The eluent flushes the column after switchover in opposite direction.

From the valve, the column is filled with sample through the channel *2->3*. The quicker part of the substances is separated through the channels *6->1* and *5->4* and transported to the detector.

Legend

① Detector

② Valve

③ Column

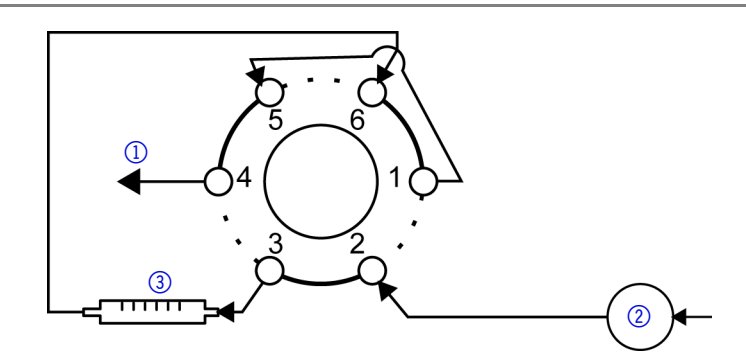


Fig. 34 Backflushing - Transport of the sample onto the column

Note Make sure there is no pressure when switching so that the column is not damaged.

After switching over the valve, heavily retarding substances are eluted in opposite direction fluid from the column and flushed back to the detector.

Legend

① Detector

② Valve

③ Column

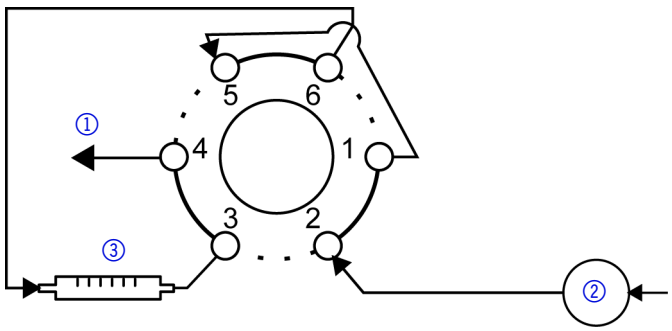


Fig. 35 Backflushing of the column

Backflushing of a Precolumn

Basics The precolumn is used in chromatography, for example in the following cases:

- Preseparation or separation of heavily retarding substances
- Protection of the main column

Note Precolumn and main column are aligned in a row behind each other.

Legend

① Detector

② Column

③ Valve

④ Detector

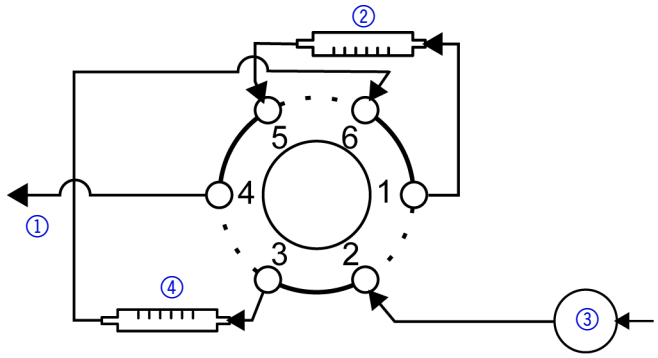


Fig. 36 Use of pre and main column

From the valve, the precolumn is filled with sample through the channel *2->3*. From the channel 6->1, the quickly dissolved substances on the column are seperated, the heavily retarding substances remain into the precolumn.

Note The eluent flushes the precolumn after switchover in opposite direction.

Legend

① Detector

② Column

③ Valve

④ Precolumn

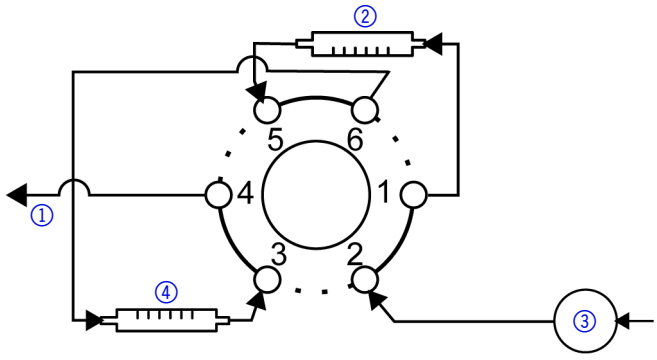


Fig. 37 Backflushing of the precolumn

After switching over of the valve, the late-eluting substances are flushed back from the precolumn to the detector.

2-position Valve 6P/2C

Column Selection

Basics The column selection with a 6P/2C valve is used in the chromatography in following cases:

Separation of the sample on the precolumn

Separation of the sample components on different columns

The sample is separated on the precolumn. The further separation can be carried out on column 1 and be continued on column 2 after switching over.

Legend

① Detector

② Column A

③ Precolumn

④ Valve

⑤ Column B

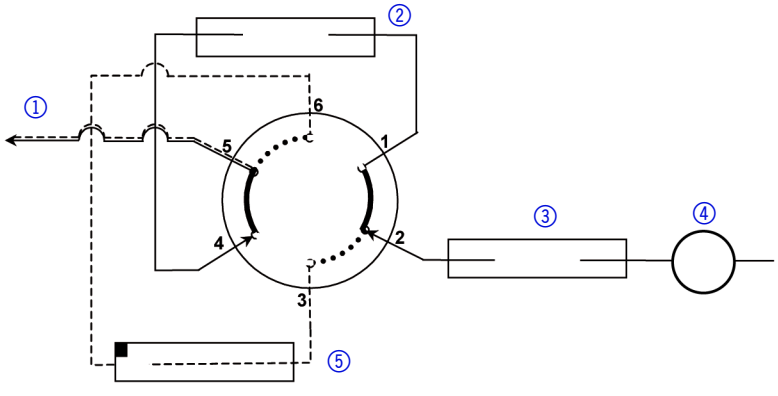


Fig. 38 Column selection with a 6P/2C valve

Precleaning of a Sample by a Precolumn

Basics The precleaning of a sample is used in chromatography, for example in the following cases:

- Preseparation or separation of heavily retarding substances

Legend

① Column

② Detector

③ Precolumn

④ Valve

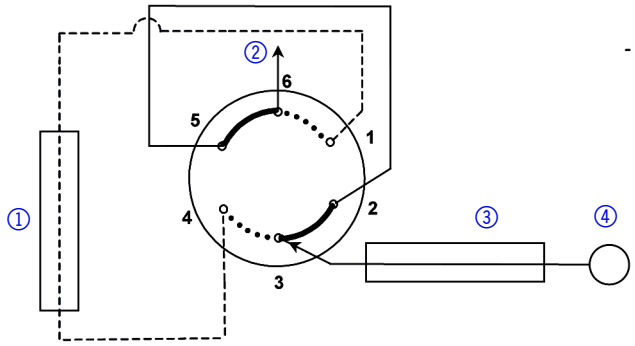


Fig. 39 Precleaning of a sample by a precolumn

After the injection of the sample the substances to be separated are heavily retarded.

The main column is switched into the flow system after the valve has been switched over. Now the sample will be transported to the main column by using a second solvent.

Degasser

Legend

① Degasser

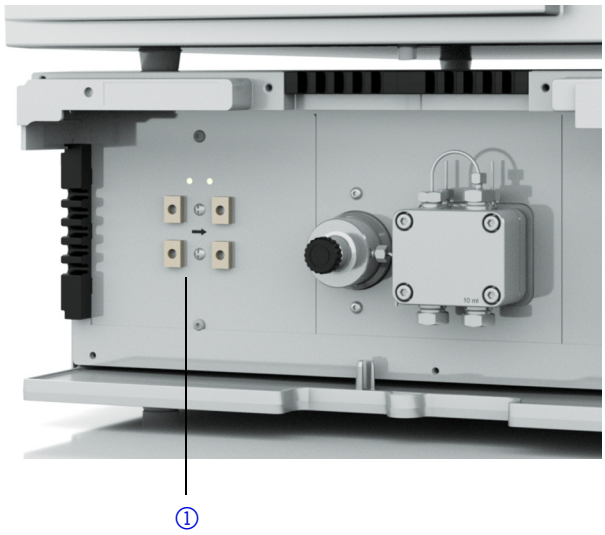
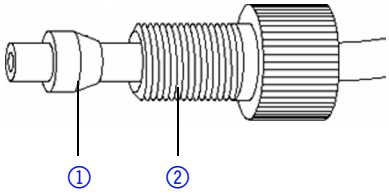


Fig. 40 Front view degasser

Connecting a Solvent Hose

Procedure

Process	Figure
1. Slide the fittings ② onto the hose. 2. Afterwards slide on the sealing ring ① with pointed side first. 3. Tighten the fittings by hand. 4. Loosen the fittings and check if the hose fits flush with the sealing ring.	 **Fig. 41 Fittings solvent hose**

Next steps Use the supplied blind fittings to seal off all unused inlets and outlets.

Connecting Degasser and Pump

Each degassing chamber features an inlet and an outlet.

- Connection of the chambers in the direction of the arrow.
- Remove the blind fittings from the degassing chamber inlets and outlets that are to be used, and keep the filler caps.
- Use blind fittings to close unused inlets and outlets.
- The inlets of the degasser chambers are connected to the solvent containers by means of tubes.
- Teflon tubes are also connected to the outlets of the degassing chambers, with screw fittings and seal rings. These tubes are then connected to the respective pump.

Meaning of the Degasser LEDs

Two LEDs at the front of the degasser in the ASM 2.1L inform about the operation condition of the degasser.

- Yellow LED
  - Shows that the vacuum has not yet reached the work range. Usually, the yellow LED lights up when the device is switched on and goes out as soon as the vacuum drops below 130 mbar.
- Green LED
  - Shows that the vacuum is within the work range. Usually this indicator lights up when the vacuum has been generated and stays on as long as the degasser is in use.

Degasser Gas Outlet

If the ASM 2.1L is equipped with a degasser, the gas outlet (exhaust) will be located on the front . Air and possibly solvent vapors will be pumped out here. If necessary, it can be combined with a fume hood or similar extraction device.

Legend

① Gas outlet

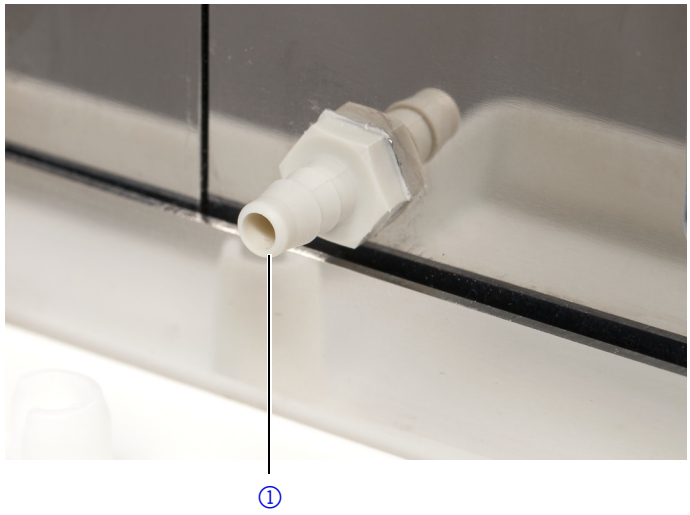


Fig. 42 ASM 2.1L gas outlet on the front

Using PEEK Fittings

PEEK fittings withstand a maximum pressure of 400 bar.

CAUTION! Damage to the flow cell caused by strongly tightened fittings!
Check the torque of screw fittings:
- 5 Nm for stainless steel fittings
- 0.5 Nm for PEEK fittings

ASM 2.1L as Compact HPLC

Isocratic System

Procedure

1. Connect the solvent bottles with degasser.
2. Connect the degasser with pump.
3. Connect the pump to the manual valve.
4. Connect the valve with column.
5. Connect the column to the detector.
6. Connect the detector to the waste bottle.

Tools Tool kit A 1033

Legend

① Degasser

② Pressure transducer

③ Pump

④ Detector

⑤ Valve

⑥ Column

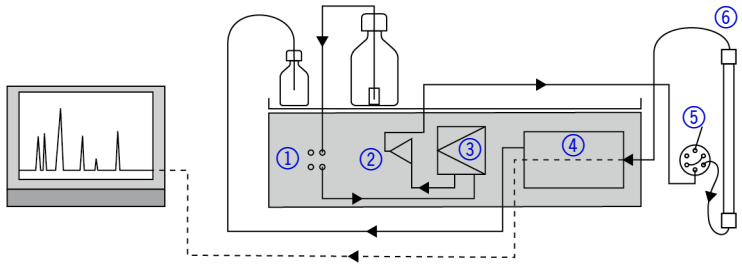


Fig. 43 Scheme of an isocratic compact HPLC system

Modules	Explanation
Connect solvent bottles with degasser	Connect suitable tubing material for the solvent to an inlet of the degasser.
Connect degasser with pump.	Install suitable solvent material from the respective outlet of the degasser to the inlet of the pump.
Connect the pump to the manual valve	Use stainless steel capillaries with an inner diameter of 0.25 mm. Use the outlet of the pressure transducer. For informations about the assignment of the valve ports please refer to section Valve.
Connect valve with column	Use stainless steel capillaries with an inner diameter of 0.25 mm.
Connect the column to the detector	Use stainless steel capillaries with an inner diameter of 0.25 mm.
Connect the detector to the waste bottle	Use stainless steel capillaries with an inner diameter of 0.25 mm.

HPG system

Procedure

1. Connect the solvent bottles with degasser.
2. Connect the degasser with pump.
3. Connect the pumps with the mixer.
4. Connect the mixer with valve.
5. Connect the valve with column.
6. Connect the column to the detector.
7. Connect the detector to the waste bottle.

Tools Tool kit A 1033

Legend

① Detector

② Pump with Smart-mix

③ Pump with pressure transducer

④ Degasser

⑤ Valve

⑥ Column

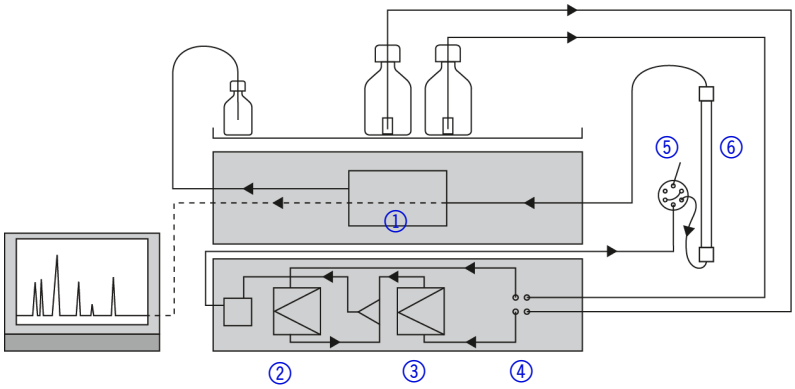


Fig. 44 Scheme of a high pressure gradient compact HPLC system

Explanation	Necessary Tools
Connect solvent bottles with degasser	Connect suitable tubing material for the solvent to an inlet of the degasser.
Connect degasser with pump.	Install suitable solvent material from the respective outlet of the degasser to the inlet of the pump.
Connect mixer with valve	Use stainless steel capillaries with an inner diameter of 0.25 mm. Use the outlet of the pressure transducer.
Connect valve with column	Use stainless steel capillaries with an inner diameter of 0.25 mm.
Connect column to detector	Use stainless steel capillaries with an inner diameter of 0.25 mm.
Connect detector to waste bottle	Use stainless steel capillaries with an inner diameter of 0.25 mm.

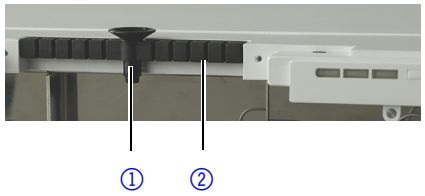
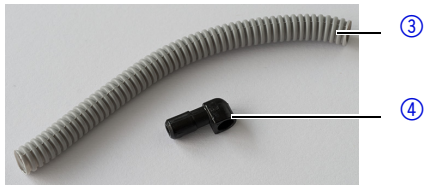
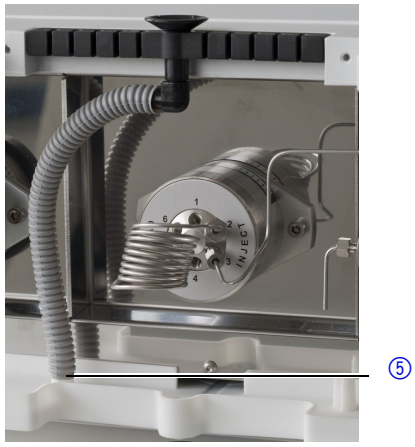
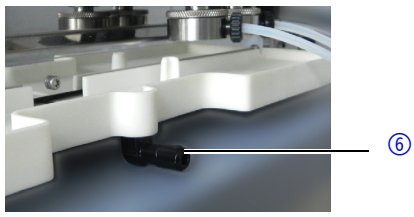
Leak Management

The leak management consists of the leak sensor and the drainage system. The drainage system ensures that escaping liquids flow into a waste bottle. If there is to much liquid, the red LED

starts flashing. Both device and data acquisition from the chromatography software are stopped.

Prerequisite Front panel has been removed.

Procedure

Process	Figure
1. Carefully push the funnel ① into the center opening of the capillary guide ② .	 **Fig. 45 Funnel and capillary guide**
2. Push the long ending of the first nozzle ④ into the hose ③ .	 **Fig. 46 Hose and nozzle**
3. Connect the nozzle and the funnel. 4. Push the other end of the hose onto the nozzle ⑤ of the leak tray. 5. For the bottom device, push the short end of the nozzle ⑥ into the opening in the collection point of the leak tray. 6. Connect the hose to the nozzle and lead the second ending to the waste bottle. 7. Place the waste bottle below the bottom device.	 **Fig. 47 Hose connected to device**  **Fig. 48 Leak tray with nozzle**

Next steps Reattach the front panel onto the device.

Connecting a Device to a Computer to a Local Area Network (LAN)

This chapter describes how to set up a local area network (LAN) and how a network administrator can integrate this LAN into a

company network. The description applies to the operating system Windows® and all conventional routers.

Note To set up a LAN, we recommend to use a router. The following steps are necessary:

Process
1. On the computer, go to the *Control Panel* and check the LAN properties.
2. Connect the router to the devices and the computer.
3. On the computer, configure the router to set up the network.
4. Install the chromatography software from the data storage device.
5. Switch on the device and run the chromatography software.

Note The port ist set to 10001 at the factory. The IP port numbers in the device configuration of the chromatography software must be identical to those in the device, otherwise the connection fails.

Configuring the LAN Settings

The LAN uses only one server (which is normally the router) from that the devices automatically receive their IP address.

Prerequisite
- In Windows power saving, hibernation, standby, automatic Windows update and screen saver must be deactived.
- In case you use a USB-to-COM box, the option "Allow the computer to turn off this device to save power" in the *Device Manager* must be deactivated for all USB hosts.
- Only for Windows 7: For the network adapter, the option "Allow the computer to turn off this device to save power" in the *Device Manager* must be deactivated.

Procedure
1. In Windows 7 chlick on *Start* ⇒ *Control Panel* ⇒ *Network and Sharing Center*.
2. Double-click on *LAN Connection*.
3. Click on the button *Properties*.
4. Select *Internet Protocol version 4 (TCP/IPv4)*.
5. Click on the button *Properties*.
6. Check the settings in the tab *General*. The correct settings for the DHCP client are:
   a) *Obtain an IP address automatically*
   b) *Obtain DNS server address automatically*
7. Click on the button *OK*.

Connecting the Cables

To avoid interference, we recommend to operate the HPLC system separate from the company network. This is why we recommend using a router.

A router has several LAN ports and one WAN port that can be used to integrate the LAN into a wide area network (WAN), e. g. a company network or the Internet. On the other hand, the LAN ports serve to set up a network from devices and a computer.

Note A patch cable is included in the accessories kit. A router is not included in the scope of delivery. To connect the router to a WAN, an additional patch cable is required, which is also not supplied within the scope of delivery.

Legend

① Modules

② Router

③ LAN port

④ WAN port

⑤ Workstation

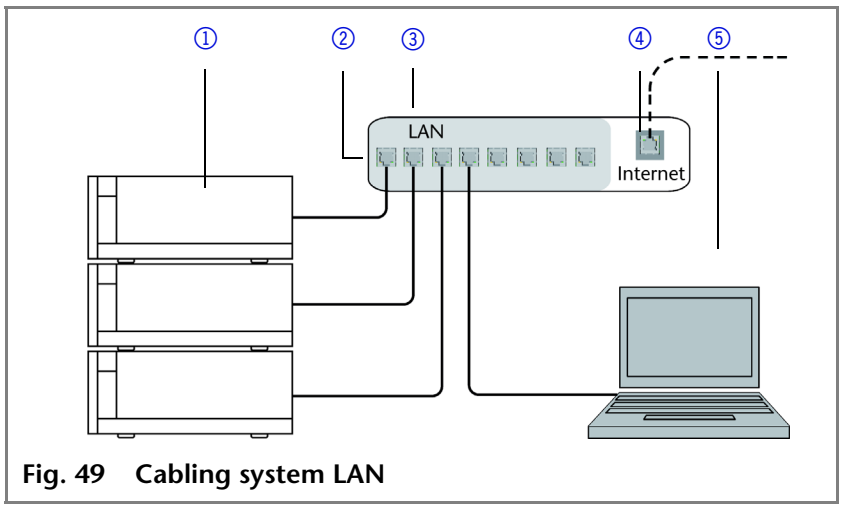


Fig. 49 Cabling system LAN

Prerequisite

- Computer is on.
- There is a patch cable for each device and the computer.

Procedure

1. Use the patch cable to connect the router and the computer. Repeat this step to connect all devices.
2. Use the power supply to connect the router to the mains power system.

Configuring the Router

The router is preset at the factory. You can find a label at the bottom side of the router, on which IP address, user name, and passwort are printed. These information help to open the router configuration.

Procedure

1. To open the router configuration, start your Internet browser and enter the IP address (not for all routers).
2. Enter user name and password.
3. Configure the router as DHCP server.
4. In the router configuration, check the IP-address range and make changes if necessary.

Result Once the router has assigned IP addresses to all devices, the chromatography software can be used to remotely control the system.

Integrating the LAN into a Company Network

A network administrator can integrate the LAN into a company network. In this case the WAN port of the router is used.

Prerequisite There is a patch cable for the connection.

Procedure

1. Check that the IP-address range of the router and of the company network do not overlap.
2. In case of an overlapping, change the IP-address range of the router.
3. Use the patch cable to connect the router WAN port to the company network.
4. Restart all device, including the computer.

Controlling Several Systems Separately in a LAN

Devices connected to a LAN communicate through ports, which are part of the IP address. If more than one HPLC system is connected to the same LAN and you plan on controlling them separately, you can use different ports to avoid interference. Therefore, the port number for each device must be changed and this same number must be entered into the device configuration of the chromatography software. We recommend to use the same port number for all devices in the same system.

Note The port ist set to 10001 at the factory. The IP port numbers in the device configuration of the chromatography software must be identical to those in the device, otherwise the connection fails.

Procedure

1. Change the port number of the device.
2. Enter the port number in the chromatography software.

Result The connection is established.

Note Refer to the troubleshooting chapter, if you experience connection problems.

Checklist prior to switch-on

Use this checklist to determine whether the system is ready for initial startup:

- The modules are at the desired location.
- The power plugs of the modules are plugged in.
- The LAN connections between the modules and router are connected.
- The LAN cable is connected to the workstation and router.
- The chromatography software has been installed by KNAUER or a company authorized by KNAUER.
- The capillaries in the solvent bottles have a filter insert.
- All capillaries are tightly connected.

Startup of the Device

CAUTION! Possible damage to the device caused by condensed water!
Allow device to acclimate for 3 h, before it is taken into operation.

Prerequisite

- Capillaries, tubings and cables are connected.
- In case of the detector the flow cell is installed.
- Liquid container is sufficiently filled.
- Washing container is sufficiently filled.

CAUTION! Damage to the pump head in case it runs dry.
Ensure that liquids runs through pump head and piston backflushing.

Procedure

Process	Figure
1. Switch on the device at the power switch ① on the rear side. 2. Wait until the device has completed the self-test. 3. If the self-test has been successfully completed, the LED ② on the right lights up green.	**Fig. 50 Power switch on the rear side of the device**

Note The firmware is successfully initialized if shortly after switching on the device all three LEDs light up red, green and blue for approx. 1 second.

Result The device is ready for operation. If the test fails an error message will be displayed. Contact the technical support of KNAUER if the error occurs several times.

Practical Tip Regularly check the capillaries for leaks.

Operation with Chromatography Software or Control Unit

A device can be operated in two ways:

- Control with chromatography software
- Control with Control Unit

Control with Chromatography Software

To control the device with chromatography software, it must be connected to the computer through the LAN interface.

AZURA Devices can be controlled with e. g. OpenLAB EZChrom edition version A.04.05 or higher, ChromGate version 3.3.2 or higher and ClarityChrom version 3.0.7 or higher.

You will find a detailed description on the chromatography software in the software manual.

Control with Control Unit

You can control the device using the touchscreen on the mobile Control Unit. The Control Unit is an optional accessory. You will find a detailed description on the Control Unit in its accompanying user manual.

Meaning of the LEDs

There are three LEDs and a switch on the front of the device.

Legend

① Left LED

② Center LED

③ Right LED

④ Switch

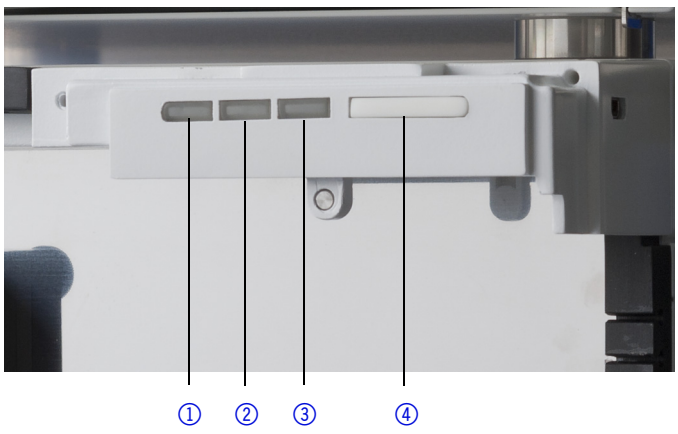


Fig. 51 LEDs and switch on the front of the device

The LEDs can have different colors depending on the operating conditions.

Standby To activate the standby, keep the switch pressed for 5 seconds.

Note Malfunctioning system after repeated standby possible. After repeatedly using the standby, switch off the power switch and back on again, to reset the data storage.

	Color	Operating condition	Operation
Left LED	red	Error message	▪ Check the system. ▪ Shortly press the switch to deactivate the error message.
Center LED	does not light	Device is switched off.	▪ Switch on the device.
	flashes green	Device not ready for measuring.	▪ Wait until the device is ready.
	green	Device is switched on.	
Right LED	green	Device active or ready for measuring.	
	blue	Device in standby	▪ Press the switch to end the standby.

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- Control with Control Unit

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You will find a detailed description on the chromatography software in the software manual.

Control with Control Unit

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Installation Qualification (IQ)

Installation report

Certification on the functionality of the device. During installation of the device, an installation report (*IQ* document) is created upon request in coordination with the Technical Support of KNAUER.

This installation report needs to be completed in full and signed by both parties. It serves as proof of the properly executed installation and functionality of the device.

Operation Qualification (OQ)

Extensive functionality test

Extensive test of the detector's functionality. A successfully executed *OQ* ensures that the detector functions properly.

Test Intervals

Run the extensive functionality test at the following time intervals:

Average use	Device test
1 to 5 days/week:	Every 6 months
More than 5 days/week or 24 hours/day:	Every 3 months
Operation with buffer solutions or other salt solutions:	Every 3 months

Execution

The test can carried out either by KNAUER's Technical Support or by a technical service authorized by KNAUER.

The *OQ* documentation required for executing the *OQ* is with costs (once) and can be ordered separately from KNAUER.

Troubleshooting

First measures

1. Check all cabling.
2. Check all screw fittings.
3. Check whether air has gotten into the supply lines.
4. Check device for leaks.
5. Pay attention to system messages.

Further measures Inform the Technical Support of KNAUER.

Possible Problems and Rectifications

	Problem	Solution
Assistant	Device will not turn on.	Inspect the power cable to ensure that it is plugged into the power supply.
Detector	Baseline drift	▪ Maintain constant temperature conditions during the measurement. ▪ Avoid air draft. ▪ Avoid vibrations.
	Device cannot be calibrated.	1. Fasten the knurled-head screws on the flow cell to prevent incursion from interfering light or an electronics error. 2. Insert the test cell. 3. Inspect the calibration with a weak absorbing eluent.
	Baseline noise	1. Inspect the flow-cell assembly. 2. Fasten the knurled-head screws on the flow cell to prevent incursion from interfering light or an electronics error. 3. Exchange the defective flow cell. 4. Inspect the service life of the lamp.
	The relationship of the signal to the light path reference is very low.	1. Flush the flow cell. 2. Clean the flow-cell window. 3. Replace the lamps
Pump	When purging, the pump switches off	Check if the bleed screw on the pressure sensor is turned open.

	Problem	Solution
	Pump does not transport solvent	▪ Purge the pump head to remove the air bubbles. ▪ Inspect the eluent filter of the HPLC column and change when blocked ▪ Clean checkl valves. ▪ Exchange the check valves. ▪ When the pump head seals are defective, solvent enters the piston backflushing. Inform the Technical Support of KNAUER. ▪ Exchange the pump head.
	Pressure and flow rate variations	▪ Pump without pressure sensor: Pay attention to the influence of the pressure on the flow rate (will not be compensate). ▪ Purge the pump head to remove the air bubbles. ▪ Always tighten the inlet screw fittings and outlet screw fittings on the pump head with a torque wrench and 7.5 Nm. ▪ Clean the check valves. ▪ Exchange the check valves. ▪ Exchange the pump head. ▪ Inform the Technical Support of KNAUER.
	Pump head leaks.	▪ Inspect the inlet and outlet screw fittings of the pump head. ▪ When the pump head seals are defective, solvent enters the piston backflushing. Inform the Technical Support of KNAUER. ▪ Exchange the pump head.
Valves	Valve leaks	Tighten the connections.
	Pressure variations caused by leaking valve head	Exchange the rotor seals.
Degasser	Air bubbles occur in the solvent tubes of the degasser outlet.	Check the inlet and outlet fittings. Replace old fittings, if necessary.

	Problem	Solution
	No eluent flow	If a buffer solution stays in the degasser for an extended period, it can cause clogging. 1. Use another degasser chamber. 2. Carefully let water flow into the clogged degasser chamber to dissolve the buffer. 3. If this does not help, contact the Technical support.
SmartMix mixer	The pump was switched off automatically, because Pmax was exceeded.	Exchange the filter system.
	Pressure increase	Replace cartridge.
	Filter system inserted wrong	Exchange the filter system.

Further measures Inform the Technical Support of KNAUER.

System Messages

If other system messages are displayed besides those listed below, please turn the device off and then on. Inform the Technical Support of KNAUER in case the system message repeats itself.

The system messages are sorted alphabetically.

	System message	Solution
A	At least one wavelength must be valid.	Check whether a channel is on. Check whether the wavelengths are within permissible range (190 to 900 nm).
C	Calibration failed	Switch the device off and on. Check whether lamps, motor and filter are functioning correctly. Inform the Technical Support of KNAUER in case the system message repeats itself. Restart calibration on the device or in the chromatography software.
	Cannot initialize	Check cables and connections in local area network.
	Cannot proceed: D2 lamp heating	Wait for the ignition of the D2 lamp.
	Cannot proceed: D2 lamp is OFF!	Switch D2 lamp on before "RUN".

	System message	Solution
	Cannot proceed: Lamps are off	Switch the lamps on the device to "ON".
	Cannot read RTC	Switch the device off and on. Inform the Technical Support of KNAUER in case the system message repeats itself.
D	Detector: calibration failed	▪ Check lamp. ▪ Check piezomotor with filter wheel.
	Detector: D2 lamp failed	Change the D2 lamp.
	Detector: D2 lamp not detected	Install a D2 lamp.
	Detector: external error detected	Error IN is connected to another device, which is defective.
	Detector: grating drive failed	▪ Replace step motor of the grating drive ▪ Replace the mainboard.
	Detector: low light	▪ Check lamp ▪ Clean flow cell
	Detector: not calibrated	Activate calibration
	Detector: validation failed	Install test cell and activate calibration
E	Error input activated	Device error. Change the device settings.
G	GUI communication failed	Replace the display.
L	Leak sensor not present	Switch the device off and then on. If the leak sensor is still not present, contact the Technical Support of KNAUER.
	Leak was detected	Switch off the device. Remove the leak and start the device afterwards.
M	Maximum pressure! System stopped	▪ Reduce the pressure or adjust the upper pressure limit. ▪ Restart the system.
	Minimum pressure! System stopped	▪ Increase the pressure or adjust the lower pressure limit. ▪ Restart the system.

	System message	Solution
P	Pump: external error detected	▪ Localize the external error and remove it. ▪ Replace the motor. ▪ Replace the mainboard.
	Pump: max. current detected	▪ Replace the motor. ▪ Replace the mainboard.
	Pump: max. pressure detected	▪ System pressure is too high. ▪ Remove the blockage ▪ Check the contacts at the motor ▪ Replace the motor.
	Pump: min. motor current detected	▪ Replace the motor. ▪ Check the motor contacts.
	Pump: min. pressure detected	Localize leak in the system and remove it.
V	Valves have different types in 'column switch' mode	Correct the settings. Both valves have to be of the same type
	Valve left: failure detected!	▪ Left valve is stiff. ▪ Drive is defective.
	Valve middle: failure detected!	▪ Middle valve is stiff ▪ Drive is defective.
	Valve right: failure detected!	▪ Right valve is stiff ▪ Drive is defective.
W	Wrong valve type	Correct the settings.

Maintenance and Care

Proper maintenance of your HPLC device will ensure successful analyses and reproducible results.

Maintenance Contract

The following maintenance work on the device may only be performed by KNAUER or a company authorized by KNAUER and is covered by a separate maintenance contract:

- Opening the device.
- Removing the hood or the side panels.

Required System Information

Serial number

The serial number can be founded with the Control Unit (*Menu⇒GLP*) as well as on the rear side of the device.

Year of manufacture

The year of manufacture forms part of the serial number of the module, example: CDA103252525. The letters designate the device type; the year of manufacture is stated as year and calendar week. In the example, the module was manufactured in calendar week 32 of the year 2010. The last five digits are the identification number for the interface card (*Interface: Serial number*).

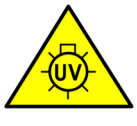
Cleaning and Caring for the Device

CAUTION! Intruding liquids can cause damage to the device!
Place solvent bottles next to the device or in a solvent tray.
Moisten the cleaning cloth only slightly.

All smooth surfaces of the device can be cleaned with a mild, commercially available cleaning solution, or with isopropanol.

Maintenance Tasks for Users

The following maintenance tasks are recommended by KNAUER and may be performed by the user.



WARNING! Irritation of retina through UV light!
Concentrated UV light can leak out from the flow cell or the fiber optic connectors.
Switch off the device and pull the power plug.

	Module	Measures
After 2000 operating hours	**Detector**	▪ Check light intensity of the D2 lamp ▪ Inspect the flow-cell assembly. ▪ Clean the flow cell. ▪ Replace the flow cell.
	Pump	▪ Control the seals.
	Valve	▪ Check screw fittings for leak loss.
	Degasser	▪ Check screw fittings for leak loss.
After 5000 operating hours	**Pump**	▪ Replace the pistons ▪ Replace the check valves
	Valve	▪ Check screw fittings for leak loss.
After 10000 operating hours	**Pump**	▪ Replace the O-rings at the plates

Detector UVD 2.1S

Cleaning the flow cell

Increased noise of the baseline and reduced sensitivity can be a result of a dirty flow cell. Often it is sufficient to rinse the flow cell to restore optimal sensitivity.

Note

Do not touch the lens or the optical fiber with bare hands. Dirty lenses or optical fibers could falsify the measurement. Wear gloves.

Rinsing the Flow Cell

CAUTION! Contamination of the flow cell caused by oil drops! Do not use compressed air for drying.

Flushing solution:

The following solvents are recommended for flushing:

- diluted HCl (1 mol/L)
- 1 mol/L NaOH aq.
- Ethanol
- Acetone

Tools

Syringe

Procedure

1. Fill the syringe with eluent.
2. Inject it into the inlet of the flow cell and allow it to act for 5 minutes.
3. Fill the syringe with water and inject again.
4. Remove the flow cell from the detector and use a nitrogen stream to dry it.

Result Flow cell is clean.

Next steps Check, if the baseline noise has disappeared.

If the rinsing does not have the desired effect, all flow cells can be disassembled to clean the lens.

Cleaning the Lens of an Analytical Flow Cell

Prerequisite

- Device is switched off.
- Power plug has been pulled.
- Flow cell has been disassembled.

Tools

- Tweezers
- Allen wrench, size 3

Legend

① Seal ring

② Lens

③ Compression part

④ Threaded ring

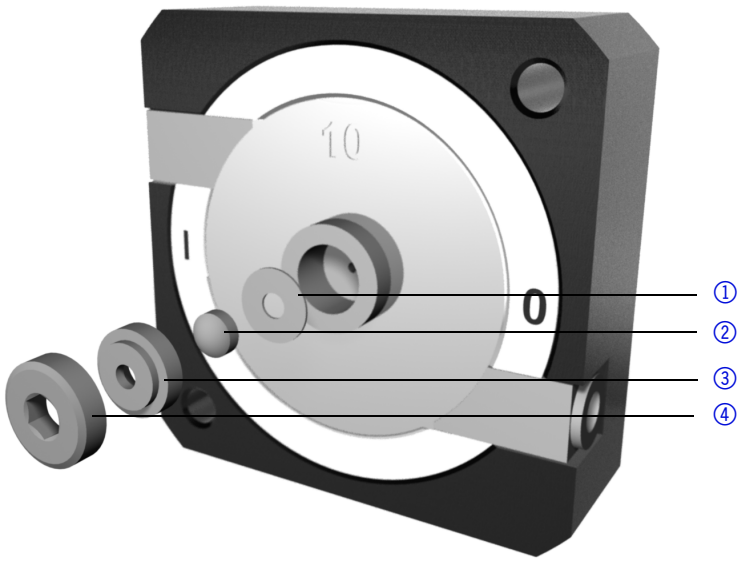


Fig. 52 Analytical flow cell

Cleaning the lens

1. Using the allen wrench, loosen the threaded ring ④.
2. Using tweezers, remove the compression part ③, or gently tap it on a clean surface.
3. The lens ② is protected by a seal ring ①. This must be renewed every time the lens is disassembled.
4. Remove the lens and clean with a clean, soft cloth or with an appropriate solvent in an ultrasonic bath.
5. Afterwards, assemble the flow cell and make sure that the new seal ring does not interrupt the light path.
6. Using the wrench, tighten the threaded ring.

Result The lens is clean.

Next steps If the cleaning does not have the desired effect, clean the light guide.

Cleaning the Light Guide of a Preparative Flow Cell

The preparative flow cells have a rod-shaped light guide instead of the concave lens of the analytic flow cells.

CAUTION! Light splitter can get contaminated, if it is being touched with bare hands!
Wear gloves.
Use a clean, soft cloth.

Prerequisite

- Device is switched off.
- Power plug has been pulled.
- Flow cell has been disassembled.

Tools

- Tweezers
- Allen wrench, size 3 mm

Legend

① Threaded ring

② Cover

③ Spacer

④ Compression bushing

⑤ Light guide with seal ring

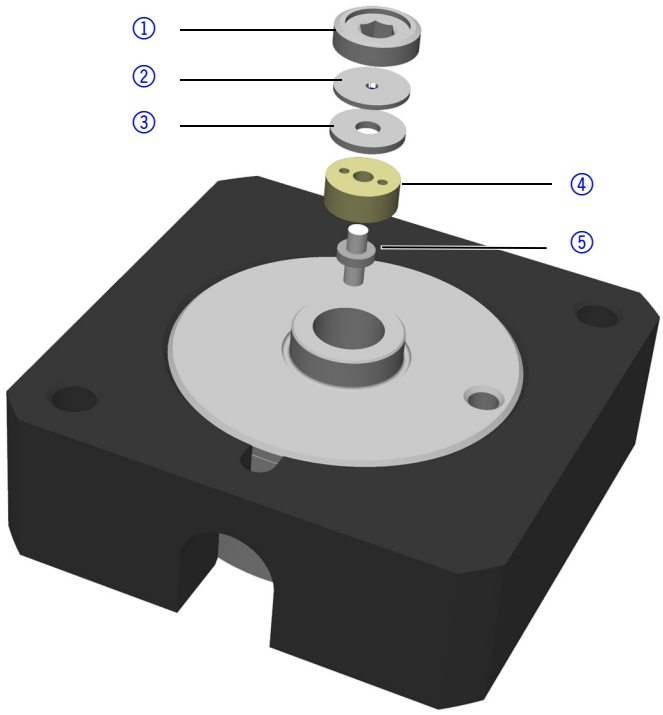


Fig. 53 Preparative flow cell

Cleaning the light guide

1. Using the Allen wrench, loosen the threaded ring ① .
2. Remove the cover ② and the spacer ③ (not part of all flow cells).
3. Using the tweezers, pull out the compression bushing ④ and the light guide ⑤ .

4. Carefully push the light guide out of the holder and strip off the seal. The seal ring needs to be renewed during every cleaning of the optical fiber.
5. Clean the light guide with a clean, soft cloth or with an appropriate solvent in an ultrasonic bath. Make sure that the clean light guide is not touched by fingers.
6. Afterwards, assemble the flow cell and make sure that the new seal ring does not interrupt the light path.
7. Using the wrench, tighten the threaded ring ① .

Result The lens is clean.

Next step Insert the flow cell.

Pump P 2.1S/P 4.1S

Tightening the Screw Fittings

1. Always tighten the inlet screw 1 ⑤ and the outlet screw 1 ② with a torque wrench and 7.5 Nm.
2. Always hold the inlet fitting 1 ⑤ with a wrench when the capillary fitting ① is being tightened with a wrench.
3. Using an Allen wrench, screw in the opposite pairs of fastening screws ④ evenly and alternately to prevent the pump pistons on the inside from jamming.

Loosening the Fittings

- Using an Allen wrench, loosen the opposite pairs of fastening screws ④ evenly and alternately to prevent the pump pistons on the inside from jamming.

Legend

① Capillary screw fitting

② Outlet screw fitting

③ Inlet screw fitting

④ Fastening screw

⑤ Inlet screw fitting

⑥ Outlet screw fitting

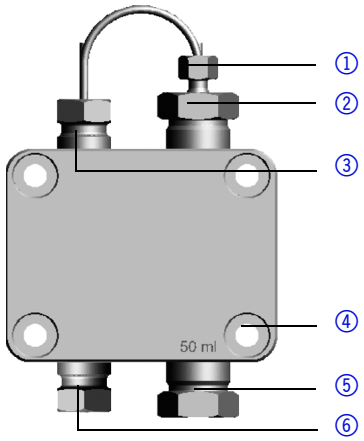


Fig. 54 Screw fittings on the pump head

Replacing the Pump Head

Depending on the requirements of the user, different pump heads are used.

Prerequisite The pump head has been flushed with suitable solvent.

WARNING! Aggressive or toxic solvent residue can irritate the skin!
Wear protective gloves.
Flush the pump head before exchanging it.

Removing the Pump Head

1. Remove the tubing from the inlet and outlet of the piston backflushing ① .
2. Unscrew the eluent line.
3. Loosen the fittings and remove the capillary ④ .
4. Loosen the opposite pairs of fastening screws ② on the pump head evenly and alternately.
5. Hold the pump head by hand, and consecutively pull out all fastening screws.
6. Remove the pump head.

Legend

① Inlet and outlet of the piston backflushing

② Fastening screw

③ Inlet screw fitting

④ Pressure transducer

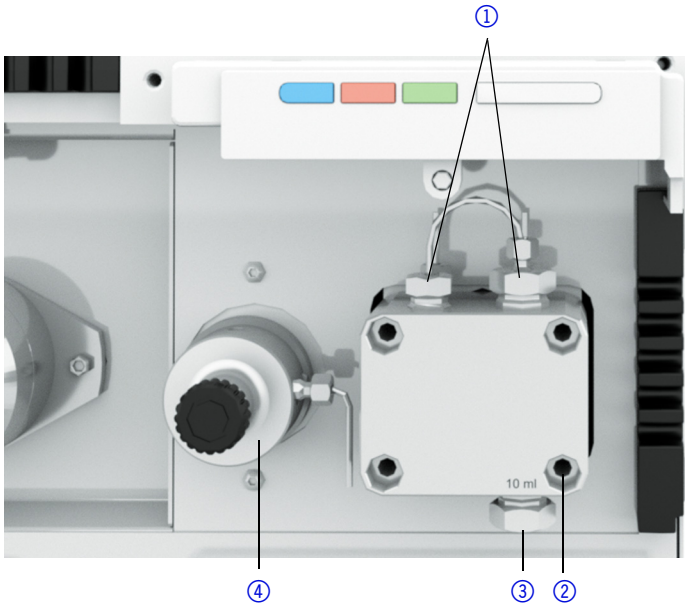


Fig. 55 Replacing the pump head

Installing the Pump Head

1. Screw in the opposite pairs of fastening screws ② evenly and alternately.
2. Tighten all fastening screws evenly with an Allen wrench.
3. Screw in the capillary with outlet fitting of the pump head and inlet fitting of the pressure sensor ④ and tighten with an Allen wrench
4. Connect the eluent line to the pump head.

Exchanging the Check Valves

Note The check and position of the valves have been harmonized to each other. Insert the valves in the direction of flow!

Legend

① Check valve

② Check (dotted line)

③ Flow direction (arrow)

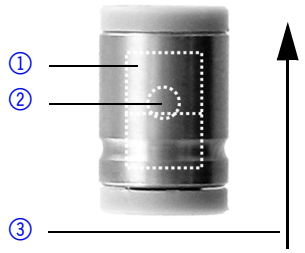


Fig. 56 Functional principle of the check valve

Dirty check valves do not open and close properly. They cause pressure fluctuations and irregular flow.

Purge the pump head before changing the check valve.

Removing the Check Valves

Note Loosen the screw fittings of the capillary connections alternately, to prevent the capillaries from bending.

1. Unscrew the inlet fitting 2 ① and capillary fitting ② .
2. Unscrew the outlet fitting 1 ③ .
3. Remove the check valve.
4. Unscrew the inlet fitting 1 ⑤ .
5. Remove the check valve.

Legend

① Inlet screw fitting 2

② Capillary screw fitting

③ Outlet screw fitting 1

④ Check valve

⑤ Inlet screw fitting 1

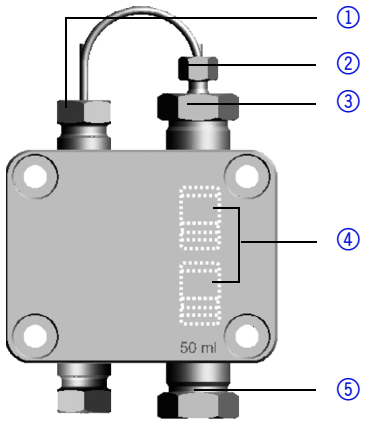


Fig. 57 Exchange the check valves

Cleaning the Check Valves

1. Put the valve in a beaker with rinsing solution, for example isopropanol or methanol.
2. Put the beaker with valve in an ultrasonic bath for at least 10 minutes.

Installing the Check Valves

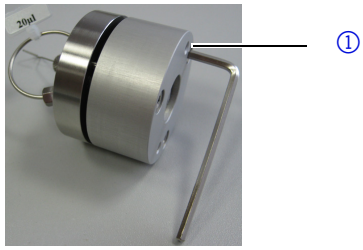
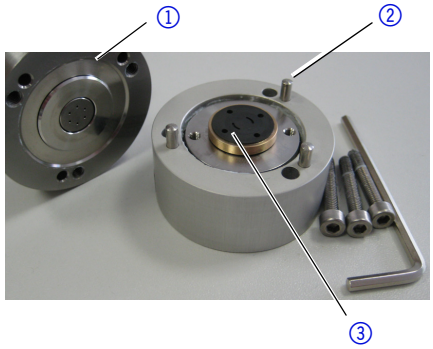
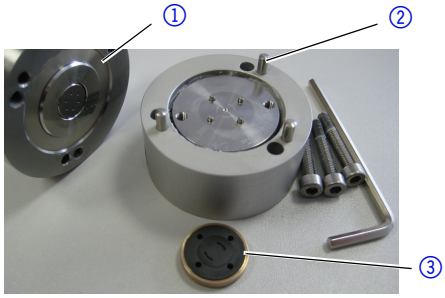
1. Insert both check valves.
2. Screw in the outlet fitting 1 ③ and tighten to 7.5 Nm with a torque wrench.
3. Screw in the inlet fitting 1 ⑤ and tighten to 7.5 Nm with a torque wrench.
4. Screw in the inlet fitting 2 ① and capillary fitting ② and tighten with an Allen wrench.

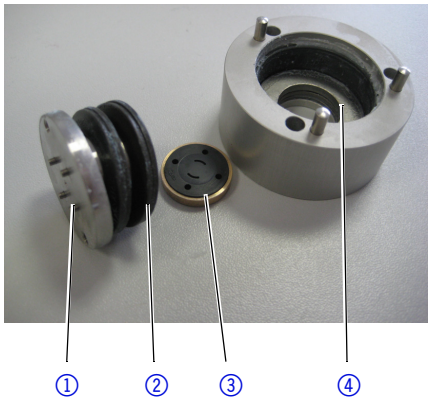
Valve

Removing the Valve

During assembly, make sure the rotor seal is in the right position and installed properly, because otherwise there may be a mix-up of the channels or clogging may occur.

Note During disassembly, make sure to mark the position of the rotor seal on the cylinder pins to make the assembly of the valve easier.

Process	Figure
1. Loosen the three screws ① alternatingly with a screwdriver (M3). Hold the housing of valve together when the screws are removed so that the individual parts do not fall out.	 **Fig. 58 Open the valve housing.**
2. Take off the top part ① . The cylinder pins ② , the inner components and the rotor seal ③ become visible.	 **Fig. 59 Remove the top part of the valve**
3. Remove the rotor seal ③ and deposit true sided. Mark the position and the installation position of the rotor seal.	 **Fig. 60 Deposit the rotor seal true sided with the marking of the position.**

Process	Figure
4. Hold the inner components of the valve and turn over the bottom part in order to deposit the inner parts orderly. Rotor plate with cylinder pins ①, four disk springs in two groups of two ②, rotor seal ③, several sealing disks ④ inside the valve.	 **Fig. 61 Inner components of the valve**

Note Pay attention to the alignment of the rotor seal in the valve during reassembly.

Alignment of the Rotor Seal in the Valve

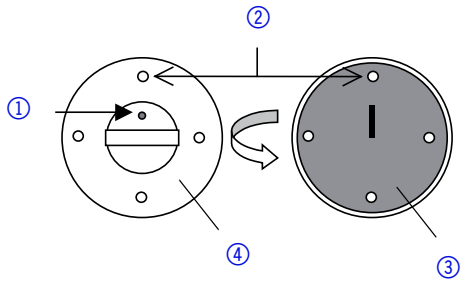
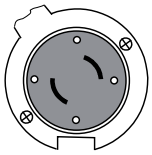
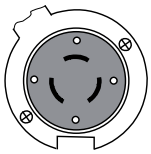
Legend

① Marking

② Cylinder pin

③ Rotor with seal

④ Rotor

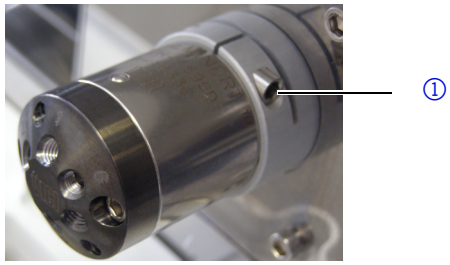
Valve type	Position of the rotor seal during installation
Multiposition valve	 **Fig. 62 Position of the rotor seal in the multi-position valve**
2-position valve 6P/2C	 **Fig. 63 Position of the rotor seal in the 6P/2C valve**
2-position valve 6P/3C	 **Fig. 64 Position of the rotor seal in the 6P/3C valve**

Exchanging the VICI Valve Head

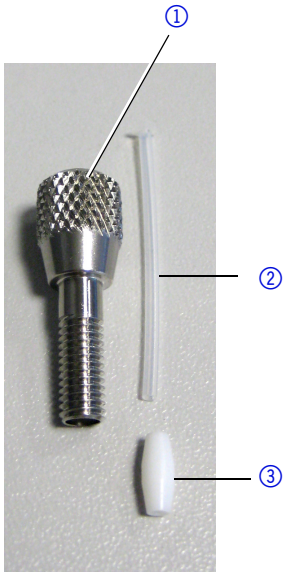
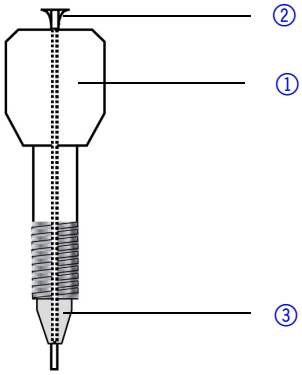
Prerequisite The device has been switched off.Werkzeug

Tool Allen wrench, size 3 mm

CAUTION! Damage to the valve or the valve drive. Exchange the valve head with the device being switched on.

Process	Figure
1. Loosen the screw ① at the valve. 2. Remove the valve. 3. Connect the new valve to the drive. 4. Tighten the screw ① at the valve. 5. Change settings on the Control Unit or in the software.	 **Fig. 65 Mounted VICI Valve**

Inserting a New Needle Seal

Process	Figure
1. Remove the old needle seal. 2. Insert the new needle seal ② into the screw fitting ① . 3. Place the biconical seal ③ on the new needle seal and turn everything into the syringe connection at the valve. 4. Screw the screw fitting ① on the valve moderately tight. 5. Insert the injection syringe all the way into the new needle seal ② . Loosen the screw fitting until the injection syringe can still be pulled out straight easily but with noticeable friction	 **Fig. 66 Biconical seal, needle seal, and screw fitting of the syringe connection**  **Fig. 67 Schematic display of the syringe connection**

Degasser

If the degasser leaks, solvent can reach the motor and from there reach the degasser exhaust and flow out. In this case, the automatic pump control will switch the device off.

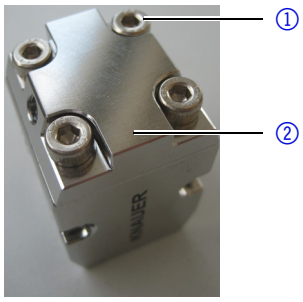
Inform the technical support of KNAUER.

SmartMix Mixer in the ASM 2.1L

If the flow rate and the gradient composition become unstable, it may be due to a blockage of the mixing chamber. The mixing chamber can be opened to change the filter system or cartridge.

Opening the SmartMix Mixer

Procedure

Process	Figure
1. Loosen the four screws ① on the mixer lid ② with an Allen wrench (wrench size 3.0 × 150). 2. Lift off the mixer lid.	Exterior view  **Fig. 68 Mixer lid**

Exchanging the Filter System

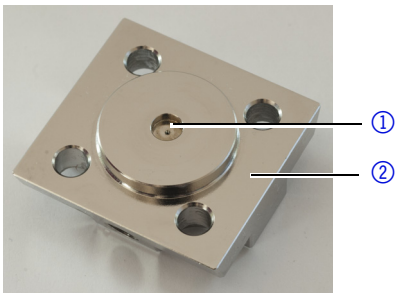
Functional principle

Several filter inserts are inserted into the SmartMix mixer in a specific order. They can be renewed as needed.

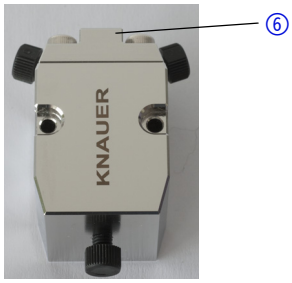
Prerequisite

- The SmartMix mixer has been removed.
- The mixer lid of the SmartMix mixer is opened.

Replacing the filter system

Process	Figure
1. Remove the filter system ① in the mixer lid ② with a pair of pointed tweezers.	 **Fig. 69 Remove the filter system from the mixer lid**

Replacing the filter system

Process	Figure
2. Insert the new filter system at position ① in the following order: - 1 unit filter round 7 µm ③ - 1 unit glass-fiber filter ④ - 1 unit filter round 3 µm ⑤	 **Fig. 70 Insert new filter system in the mixer lid**
3. Put on the mixing lid ⑥ with the fittings of the capillaries. 4. Put the mixer lid with the replaced filter system onto the mixer housing with the cartridge and the PEEK sealing ring. 5. Tighten the four screws on the mixer lid with an Allen wrench (wrench size 3.0 × 150).	

Replacing the Cartridge

The design of the cartridges is different, depending on the version of the SmartMix mixer.

Prerequisite

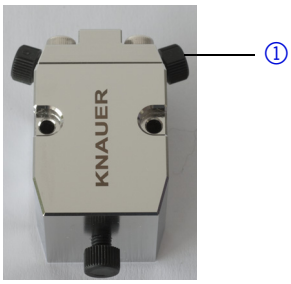
- The capillaries were loosened.
- The SmartMix mixer has been removed.

Procedure

- Loosen and lift off the mixer lid.
- Remove the PEEK sealing ring.
- Replace the cartridges.
- Put PEEK sealing ring back on

Note Do not use any metal tools to take the cartridge out of the housing. Otherwise, damage might be done to the seals of the cartridge.

1. Take the PEEK sealing ring, lying on the cartridge, off the cartridge.



Check the PEEK sealing ring for any possible damage; replace sealing ring if necessary (filter insert kit A0164-1).

2. Take cartridge out of the housing.
3. Insert the new cartridge. The insertion direction does not play any role hereby. Do not remove the filters in the lid.
4. Place the PEEK sealing ring on the cartridge.
5. Put on the mixer lid with the screw fittings of the capillaries ① as shown in the picture.
6. Put the mixer lid onto the mixer housing with the cartridge and the PEEK sealing ring.
7. Tighten the four screws on the mixer lid with an Allen wrench (wrench size 3.0 × 150).

Technical Data

Ambient Conditions

Temperature range	10 – 40 °C; 50 – 104 °F
Air humidity	10 – 90 %, non-condensing

Assistant ASM 2.1L

Maximum weight	approx. 14 kg (depending on configuration)
Dimensions	361 × 158 × 523 mm (Width × Height × Depth)
Power supply	100 – 240 V; 50 – -60 Hz; maximum 100 W
Operation	▪ Digital: via LAN, Control Unit ▪ Analog: Integrator (±2,5 V), Pin header

Degasser DG 2.1S

Channels	2-4
Function	Gas permeation through a fluoropolymer membrane
Inner diameter of the Teflon AF® capillaries	1.14 mm
Flow rate	maximum 10.0 ml/min
Pressure drop	1.37 mm Hg/ml/min)
Pressure resistance	maximum 7 bar
Dead volume	approx. 285 µl per channel
Wetted materials	PEEK, glass-filled PTFE, Teflon AF®

Detector UVD 2.1S

Product type	Monochromatic 1-channel spectral photometer with reference beam
Wavelength range	190 – 500 nm
Channels	1
Data rate	50 Hz
Light source	Deuterium lamp
Flow cell	Delivery with flow cell 10-µl flow cell with 10-mm path length
Optical bandwidth	$\Delta\lambda$ 13 nm
Wavelength accuracy	± 3 nm
Wavelength precision	0,7 nm (ASTM E1657-94)
Signal noise	30 µAU (ASTIM) at 254 nm
Drift	300 µAU/h
Sensitivity	6×10^{-5} AU at 1 Hz
Linearity	> 2.0 AU

Pump P 2.1S/P 4.1S

Conveying system	Dual-piston pump with main and auxiliary piston
Flow rate range	▪ 10 ml pump head: 0.001 - 10 ml/min ▪ 50 ml pump head: 0.01 - 50 ml/min
Maximum pressure	▪ 10 ml pump head: 40 MPa to 10 ml/min Imax = 70 ▪ 50 ml pump head: 15 MPa to 50 ml/min Imax = 80
Flow rate accuracy	▪ ±1 % at 1 ml/min ▪ For pumps without a pressure transducer dependent on pressure
Flow rate precision	Relative standard deviation RSD: < 0.5 % (1 ml/min)

Valve Drive V 2.1S

Operation	▪ LAN ▪ RS-232 ▪ Pin header ▪ Buttons on the device ▪ Chromatography software ChromGate or ClarityChrom
Power supply	External 24 Volt DC power supply
Maximum power consumption	60 W
IP protection class	IP-20
Weight	1.86 kg
Switch duration of the valve	150 ms

Valves

Material	▪ Stainless steel; 1/16"; 1/8" ▪ PEEK; 1/16"; 1/8"
Connectors	1/16"; 1/8"
Seals	Rotor seals made of VESPEL, TEFZEL, POM-H-TF or ETFE
Diameter valve	47.5 mm

SmartMix Mixer

Flow rate of SmartMix Mixer

Gradient system	LPG	HPG
Analytical version	0.5 - 2.0 ml/min	< 5 ml/min
Micro version	0.1 - 0.5 ml/min	< 1.5 ml/min

Cartridge

Analytical cartridge	350 µl mixture volume
Micro cartridge	100 µl mixture volume

Spare Parts and Accessories

Device

Note If a compact HPLC was ordered, tools and capillaries are within the scope of delivery. The torque wrench for pumps is not within the scope of delivery.

	Name	Order number
	ASM 2.1L with micro devices	depending on selection
	User manual German User manual English	V6815 V6815A
	Accessories kit AZURA	FZA02
Accessories	Control Unit	AZD00
Compact HPLC	Capillary kit, 1/16” stainless steel	A9849
	Tool kit	A1033
	Solvent tray	AZC00
Compact HPLC HPG	UVD 2.1L	EDA01
	Flow cell	A4061
	Magnetic column holder	A9847

Flow Cells

	Technical Data		Order number
Analytical	**Layer thickness** **Connection** **Inner diameter** **Volume** **Material** **Max. flow rate** **Max. pressure**	10 mm 1/16“ 1.1 mm 10 µl Stainless steel with heat exchanger 20 ml/min 300 bar	A4061V2
Analytical	**Layer thickness** **Connection** **Inner diameter** **Volume** **Material** **Max. flow rate** **Max. pressure**	10 mm 1/16“ 1.1 mm 10 µl Stainless steel with heat exchanger 20 ml/min 300 bar	A4061

	Technical Data		Order number
Analytical	**Path length** **Connection** **Volume** **Inner diameter** **Max. flow rate** **Max. pressure** **Body material**	10 mm 1/16“ 10 µl 1.1 m 20 ml/min 300 bar Stainless steel with heat exchanger	A4061XB
Analytical	**Layer thickness** **Connection** **Inner diameter** **Volume** **Material** **Max. flow rate** **Max. pressure**	3 mm 1/16“ 1.0 mm 2 µl Stainless steel 50 ml/min 300 bar	A4042
Analytical	**Layer thickness** **Connection** **Inner diameter** **Volume** **Material** **Max. flow rate** **Max. pressure**	3 mm 1/16“ 1.0 mm 2 µl PEEK 50 ml/min 30 bar	A4045
Preparative	**Layer thickness** **Connection** **Inner diameter** **Volume** **Material** **Max. flow rate** **Max. pressure**	0.5 /1.25 /2 mm 1/8“ 2.3 mm 25 µl Stainless steel 1000 ml/min 200 bar	A4066
Preparative	**Layer thickness** **Connection** **Inner diameter** **Volume** **Material** **Max. flow rate** **Max. pressure**	0.5 /1.25 /2 mm 1/8“ 2.3 mm 25 µl PEEK 1000 ml/min 100 bar	A4067
Preparative	**Layer thickness** **Connection** **Inner diameter** **Volume** **Material** **Max. flow rate** **Max. pressure**	0.5 /1.25 /2 mm 1/4“ 4.0 mm 160 µl Stainless steel 10000 ml/min 200 bar	A4068

	Technical Data		Order number
Preparative	**Layer thickness** **Connection** **Inner diameter** **Volume** **Material** **Max. flow rate** **Max. pressure**	0.5 mm 1/16“ 0.8 mm 3 µl Stainless steel 250 ml/min 200 bar	A4069
Preparative	**Layer thickness** **Connection** **Inner diameter** **Volume** **Material** **Max. flow rate** **Max. pressure**	0.5 mm 1/16“ 0.8 mm 3 µl PEEK 250 ml/min 100 bar	A4095
U-Z View™ Micro	**Layer thickness** **Connection** **Inner diameter** **Volume** **Material** **Max. flow rate** **Max. pressure**	8 mm 1/16“ 0.15 mm 0.14 µl Quartz glass 0.10 ml/min 500 bar	A4091
U-Z View™ Micro	**Layer thickness** **Connection** **Inner diameter** **Volume** **Material** **Max. flow rate** **Max. pressure**	8 mm 280 µm 0.015 mm 0.035 µl Quartz glass 0.01 ml/min 500 bar	A4092

Pump heads

Name	Order number
10 ml pump head, stainless steel	A54123-1
10 ml pump head, titanium	A54121-1
10 ml pump head, ceramics	A54122
50 ml pump head, stainless steel	A54133
50 ml pump head, titanium	A54131

Valves

	Name	Order number
	Injection syringe 100 µl	A0726
2-position valves	6P/3C, 1/16", stainless steel	A1357
	6P/2C, 1/16", stainless steel	A1357-2
	6P/3C, 1/16", PEEK	A1358
	6P/2C, 1/16", PEEK	A1358-1
	6P/3C, 1/8", stainless steel, luer-lock cannula	A1359
	6P/3C, 1/8", PEEK, luer-lock cannula	A1360
	6P/3C, 1/16", stainless steel	A1369
	6P/2C, 1/16", stainless steel	A1369-1
	6P/3C, 1/16", PEEK	A1370
	6P/3C, 1/8", stainless steel, luer-lock cannula	A1371
	6P/2C, 1/8", stainless steel, luer-lock cannula	A1371-1
	6P/3C, 1/8", PEEK, luer-lock cannula	A1372
Multiposition valve	6 port, 1/16", stainless steel	A1373
	6 port, 1/16", PEEK	A1374
	6 port, 1/8", stainless steel	A1375
	6 port, 1/8", PEEK	A1376
	12 port, 1/8", stainless steel	A1378
	16 port, 1/16", stainless steel	A1379

Sample Loops for the Valve

Versions of the listed sample loops with 1/16” and in stainless steel.

Sample loop	Order number
5 µl	A0331
10 µl	A0561
15 µl	A0562-1
20 µl	A0562
30 µl	A0836
50 µl	A0563
75 µl	A0837
100 µl	A0564
200 µl	A0565
250 µl	A2565
500 µl	A0566
1000 µl	A0567
2000 µl	A0568
3 ml	A1598
5 ml	A0586
10 ml	A1054-2
40 ml	A1055-1

Note Sample loops in PEEK are also available. Sample loops in PEEK and stainless steel are also available with fittings 1/8”.

Holding Bracket for Valves, Columns, and Flow Cells

	Name	Order number
Valves	Holding bracket for KNAUER valve, complete	A9853
	Holding bracket for VICI Valco valves, completely with adapter plate	A9853-1
	Holding bracket for VICI Valco valves, completely with adapter plate	A9853-2
Flow cells	Holding bracket for KNAUER flow cells, completely with adapter plate	A9853-5

Mixer

Name	Order number
SmartMix mixer 350	A5350
SmartMix mixer 100	A5351
Analytical cartridge (350 µl)	A5356
Micro cartridge (100 µl)	A5355
Filter set for SmartMix	A0164-1

Abbreviations and Terminology

Here you can find information on the abbreviations and terminology used in this system manual.

Term	Explanations
Backflushing	Backflushing of columns or precolumns to separate heavily retarding substances by changing the flow direction.
Channel	The connection of two valve ports by a special form of rotor seal
Dead volume	The dead volume of an HPLC system is the volume of the mobile phase, which is required to fill all hollow spaces of the HPLC system like capillaries, mixing chamber, valve etc. except the column. The dead volume should be as small as possible.
Degasser	Degasser module for fluids
GLP	Good Laboratory Practice – quality assurance for laboratories
Gradient	Time-dependent composition of solvent (mobile phase) on low-pressure or high-pressure side of system
HPG	Operating mode of HPLC system; separation of sample mixtures using high pressure gradient of pump
HPLC	High performance liquid chromatography
Integration time	The integration time determines how fast the detector reacts to changes in absorbance.
Isocratic	Sample mixtures separated with a constant composition of solvent
IQ	The IQ is the certification on the functionality of the device.
LED	Light-emitting diode
Luer-lock cannula	Standardized connection system between syringes and cannulaes
OQ	Comprehensive functionality test of individual components in a system (operation qualification)
Port	Connector on a valve
Retarding	A substance which has a delayed elution caused by an interaction with the column fill material.

Term	Explanations
Router	Module in computer network that checks data packets and forwards them.
Solvents	Mobile phase (eluent) or carrier for liquid chromatography

Legal Information

Warranty Conditions

The manufacturer's warranty for the device is valid for 12 months after the date of dispatch. All warranty claims shall expire in the event that any unauthorized changes are made to the device.

During the warranty period, any components with material or design related defects will be replaced or repaired by the manufacturer free of charge.

This warranty excludes the following:

1. Accidental or willful damage
2. Damage or errors caused by third parties that are not contractually related to the manufacturer at the time the damage occurs
3. Wear parts, fuses, glass parts, columns, light sources, cuvettes and other optical components
4. Damage caused by negligence or improper operation of the device and damage caused by clogged capillaries
5. Packaging and transport damage

In the event of device malfunctions, directly contact the manufacturer.

Manufacturer

Wissenschaftliche Gerätebau
Dr. Ing. Herbert KNAUER GmbH
Hegauer Weg 38
14163 Berlin, Germany
Phone: +49 30 809727-0
Fax: +49 30 8015010
E-Mail: info@knauer.net
Internet: www.knauer.net

Transportation Damages

The packaging of our devices provides the best possible protection against transportation damage. Check the devices for signs of transportation damages. In case you notice any damage, contact the technical support and the forwarder company within three workdays.

Disposal

Drop-off old devices at the certified waste facilities, where they will be disposed of properly.

AVV marking

According to the German "Abfallverzeichnisverordnung" (AVV) (January, 2001), old devices manufactred by KNAUER are marked as waste electrical and electronic equipment: 160214

WEEE registration

KNAUER as a company is registered by the WEEE number DE 34642789 in the German "ElektroAltgeräteRegister" (EAR). It belongs to category 8, under which fall all medical devices and laboratory equipment.

Within the meaning of the WEEE directive, all distributors and importers are responsible for the disposal of old devices. End-users can send their old devices, which must have been manufactured by KNAUER, back to the distributor, the importer, or the company free of charge, but would be charged for their disposal.

Declaration of Conformity

Manufacturer name and address

Wissenschaftliche Gerätebau
Dr. Ing. Herbert KNAUER GmbH
Hegauer Weg 38
14163 Berlin, Germany

ASM 2.1L

Product number: EY

The device complies with the following requirements and product specifications:

- DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)
- DIN EN 60799 (June 1999) Electrical accessories - Cord sets and interconnection cord sets
- IEC 61010-1 (2010 + Corrigendum: 2011) Safety requirements for electrical equipment for measurement, control and laboratory use
  - Low voltage directive (2006/95/EC)
- EN 61000-3-2 (2005 + A1:2008 + A2:2009) Electromagnetic compatibility (EMC) Part 3-2
  - EMC standard (2004/108/EC)
- IEC 61326-1 (2006) Electrical equipment for measurement, control and laboratory use – EMC requirements
  - EN 61326-1 Corrigendum 2 (2011)
- Directives for an environmentally sound use of electrical and electronic equipment
  - RoHS directives 2002/95/EC (2003) and 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment
  - WEEE directive 2002/96/EC (2003) and 2012/19/EU on waste electrical and electronic equipment

The product was tested with a typical configuration.

Berlin, 2013-06-10

Dr. Alexander Bünz (Managing Director)

The mark of conformity has been applied to the rear panel of the device.

CE

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IQ for Knauer Devices

IQ – Installation Qualification

AZURA ASM 2.1L – VASM21LA

Device data

Device version		
Serial number		
Inventory number*		
Knauer product number		
Firmware version		
Location		
Application software	ClarityChrom® ☐	ChromGate® ☐
Version number		
Place of installation		
Device manufacturer	Wissenschaftlicher Gerätebau Dr. Ing. Herbert Knauer GmbH Hegauer Weg 38 14163 Berlin support@knauer.net	
Contact	Name:	
	Street:	
	Postcode:	City/Town:
	Telephone:	
	E-mail:	
Guarantee valid until		
Date of execution		

*if applicable

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Rules on reproduction and duplication

This document contains confidential information and may not be reproduced without the written consent of Wissenschaftlicher Gerätebau Dr. Ing. H. Knauer GmbH.

IQ certificate

The authorized Knauer agent will inspect the device and perform the necessary tests as described in the IQ document. All results are noted using a blue pen and confirmed with the date (DD-MM-YYYY) and signature.

The IQ has been performed to the satisfaction of both parties.

The users listed below were instructed and are familiar with how to operate the device.

Responsible person			
	Name: (in block letters)	Date:	Signature:
Authorized agent of customer			
	Name: (in block letters)	Date:	Signature:

Objective

The objective of the installation qualification is to define requirements and acceptance criteria for the device.

Proper delivery and installation of the device will be documented.

Instructions

The IQ is carried out by an authorized Knauer agent in accordance with the instructions described below as well as the attached and approved report.

Any deviations to the specifications and problems encountered during installation shall be recorded as comments at the end in the document 'Installation Qualification – Deviations'. In addition, all courses of action undertaken to resolve the problems and remove the deviations shall be recorded as comments in the document 'Installation Qualification – Deviations'.

If certain items in the report are not applicable, these must be indicated by 'n/a' (not applicable). Larger sections that are not used must be crossed out (diagonal line through them), marked with 'n/a' and date (DD-MM-YYYY), and signed.

Enter 'yes', 'no' or 'n/a' in the column 'Within the scope of delivery' in the tables. In the 'Comments' column, enter the reference number for the document 'Installation Qualification – Deviations'.

The deviation is described with the corresponding reference number in the document 'Installation Qualification – Deviations'.

All required documents should be completed promptly on-site.

The document will be reviewed by a person authorized by the laboratory director. The inspection must be documented with the date (DD-MM-YYYY).

Shipkit, list of hardware and software

Quantity	Device/accessory	Order number	Within the scope of delivery (Yes/No)	Comment
1	ASM 2.1L			
	Shipkits of Modules			
1	Accessory Kit AZURA	FZA02		
1	Power cord			
1	ASM 2.1L Manual DE	V6815		
1	ASM 2.1L Manual EN	V6815A		
1	IQ ASM 2.1L DE	VASM21L		
1	IQ ASM 2.1L EN	VASM21LA		

Initial startup

No.	Action	Result	Passed Yes	Passed No	Comment
1	Identify the device.	The device is correct.			
2	Check for transport damage.	No transport damage is observed.			
3	Check the shipkit.	The shipkit is complete.			
4	Connect the device to the power supply.	The device is connected.			
5	Connect the device via patch cabel or plug in the control unit.	The device is connected.			
6	Connect tubings and capillaries.	Tubings and capillaries are connected.			
7	Switch the device on using the power switch.	The device starts. The display lights up, if applicable.			

Installation Qualification – Deviations

Any deviations that occur must be recorded here.

Ref. No	Description of deviation	Action	Accepted/corrected Date and signature of both parties
1			
2			
3			

Appendices

	Available	Comment
1. Order confirmation		
2. Delivery note		
3. List of small and wear parts		
4. Delivery logbook		
5. Knauer maintenance and service – authorization		
6. Other documents		

Comments

Responsible person

Name: (in block letters) Date: Signature:

Authorized agent of customer

Name: (in block letters) Date: Signature:

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